

■ Precision Cooling
For Business-Critical Continuity

Liebert PEX

User Manual - Large Frame



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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Liebert PEX. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment.

Adhere to all warnings, cautions and installation, operating and safety instructions on the unit and in this manual. Follow all operating and user instructions.



WARNING

Risk of electric shock. Can cause injury or death.

Disconnect local and remote power supplies before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The iCOM microprocessor does not isolate power from the unit, even in the “unit off” mode. Some internal components require and receive power even during the “unit off” mode of iCOM control.

The PEX unit isolation switch is inside the unit. The line side of this switch contains live high voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote isolation switch. Refer to unit electrical schematic.

Follow all local codes.



WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause injury or death.

This unit contains fluids and gases under high pressure. Relieve pressure before working with piping.



WARNING

Risk of refrigerant system rupture or explosion from overpressurization. Can cause equipment damage, injury or death.



NOTE

The Liebert PEX indoor cooling unit has a factory-installed high pressure safety switch in the high side refrigerant circuit.



WARNING

Risk of high-speed moving parts. Can cause injury or death.

Disconnect all local and remote electric power supplies before working in the unit.



CAUTION

Risk of contact with hot surfaces. Can cause injury.

The compressors, refrigerant discharge lines, humidifiers and reheats are extremely hot during unit operation. Allow sufficient time for them to cool before working within the unit cabinet. Use extreme caution and wear protective gloves and arm protection when working on or near hot compressors, discharge lines, humidifiers and reheats.



CAUTION

Risk of leaking water. Can cause equipment and building damage.

This unit requires a water drain connection. It also requires an external water supply to operate.

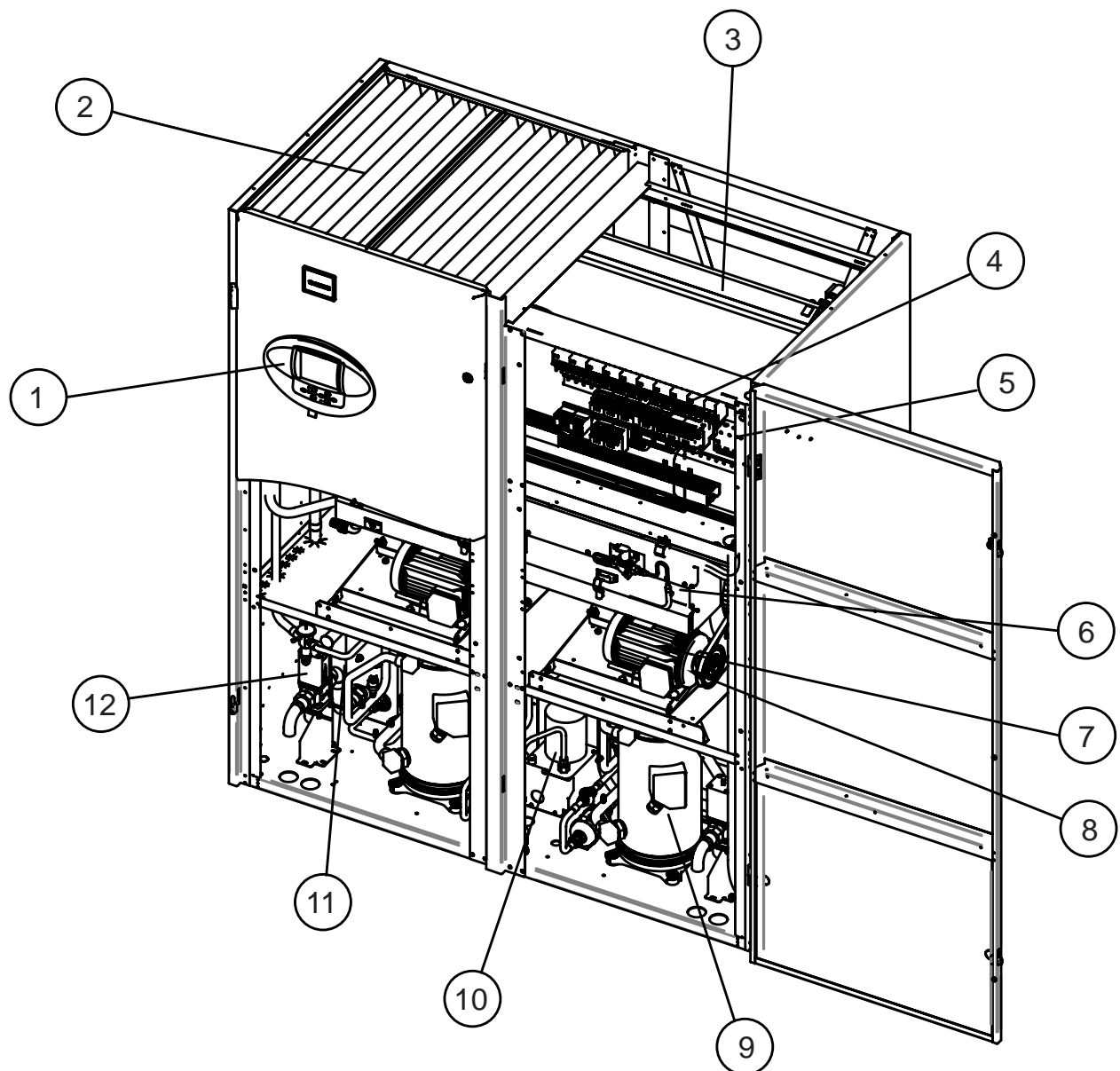
Improper installation, application and service practice can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

Emerson recommends installing leak detection equipment for unit and supply lines.

1.0 LIEBERT PEX COMPONENTS AND NOMENCLATURE

Figure 1 Downflow model component locations, air/water/glycol cooled systems



- | | |
|-------------------------|--------------------------------|
| 1. iCOM Control Display | 7. Fan Motor |
| 2. Filters | 8. Fan Pulley |
| 3. Evaporator Coil | 9. Compressor |
| 4. Electrical Panel | 10. Condensate Pump (optional) |
| 5. Input Isolator | 11. Water Cooled Condenser |
| 6. Infrared Humidifier | 12. Water regulating Valve |

Figure 2 Upflow model component locations - air/water/glycol/chilled water systems

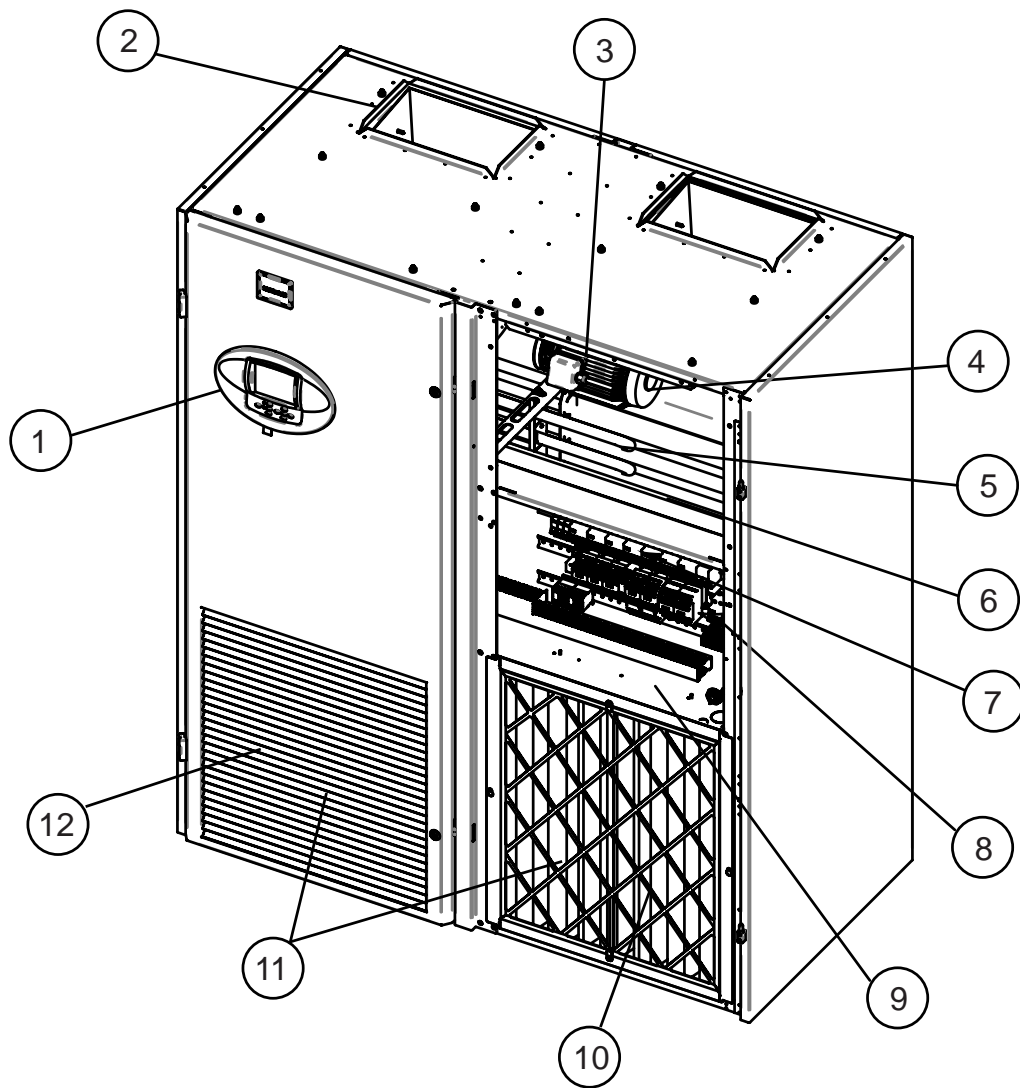
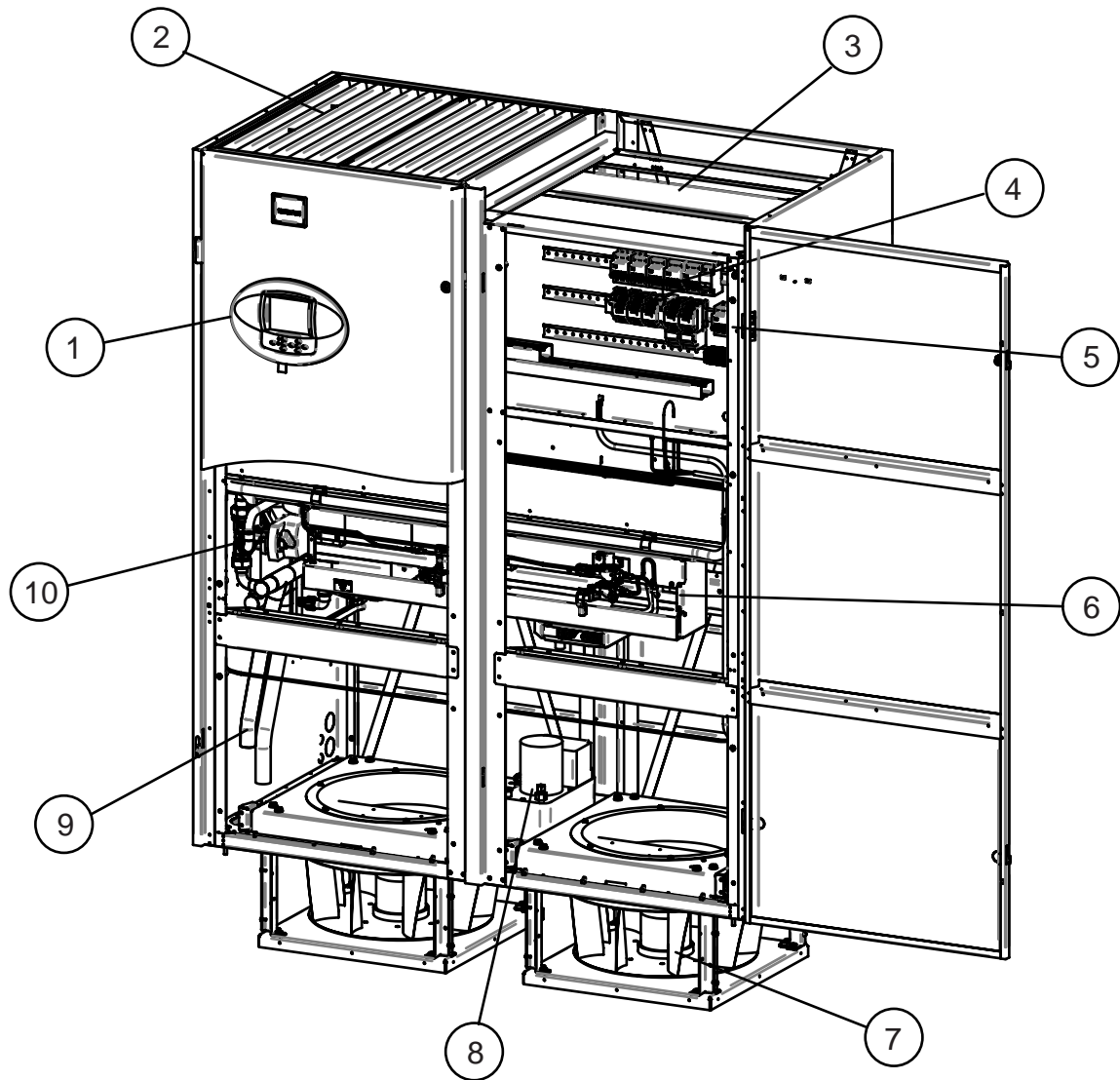


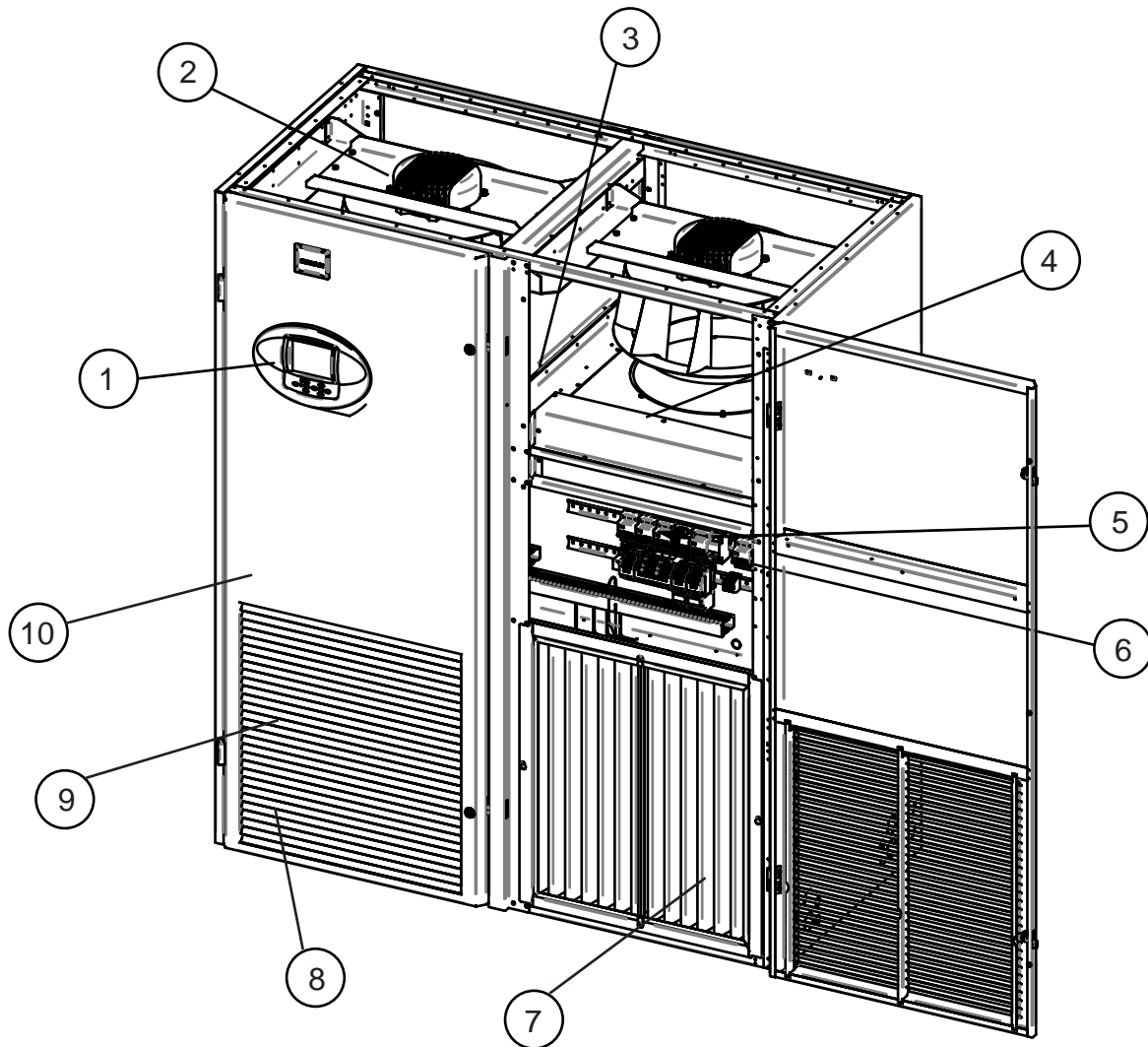
Figure 3 Downflow model component locations - chilled water EC fan systems



- 1. iCOM Control Display
- 2. Filters
- 3. Evaporator Coil
- 4. Electrical Panel
- 5. Input Isolator

- 6. Infrared Humidifier
- 7. EC Fan Motor (guard not shown)
- 8. Condensate Pump (optional)
- 9. Chilled water supply/return pipes
- 10. Dual chilled water valves/actuators

Figure 4 Upflow model component locations - chilled water EC fan systems



- 1. iCOM Control Display
- 2. EC Fan Motor
- 3. Electric Reheat
- 4. Evaporator Coil
- 5. Electrical Panel

- 6. Input Isolator
- 7. Filters
- 8. Chilled water supply/return pipes
- 9. Return Air Grille
- 10. Dual chilled water valves/actuators

Figure 5 Liebert PEX model number nomenclature

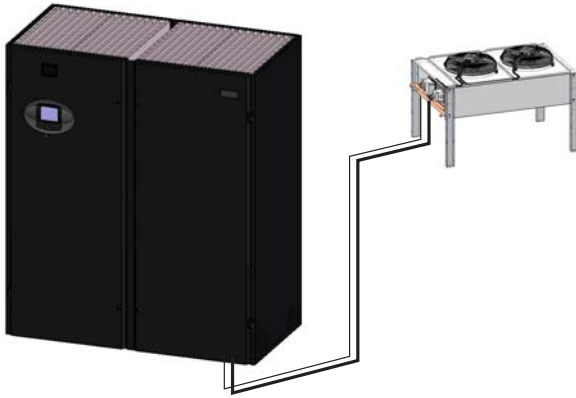
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	P	2	0	4	0	D	A	R	M	L	1	R	0	0	0
Product Range															
P = PEX															
No. Modules - Bays/Fans															
1 = One															
2 = Two															
3 = Three															
Nominal kW															
20, 30, 40 to 150															
Air Path															
F = Downflow (Forward Curve)															
G = Downflow (EC Backward Curve)															
U = Upflow (Forward Curve)															
V = Upflow (EC Backward Curve)															
D = Upflow Ducted (Forward Curve)															
Cooling Type															
A = Air Cooled															
W = Water Cooled															
G = Glycol Cooled															
C = Chilled Water															
Cooling Control															
R = R-22, scroll, 2 compressors															
S = R-407C, scroll, 2 compressors															
P = R-22, scroll, 1 compressor															
Z = R-407C, scroll, 1 compressor															
2 = 2 way CWV (CW, zero compressors)															
3 = 3 way CWV (CW, zero compressors)															
Voltage															
M = 400/3/50															
A = 460/3/60															
B = 575/3/60															
C = 208/3/60															
D = 230/3/60															
E = 416/3/60															
2 = 380/3/60															
J = 200/3/60															
iCOM Display															
S = Small Graphics Display															
L = Large Graphics Display															
Reheat Type															
0 = None															
1 = 1 Stage															
2 = 2 Stage															
Humidification															
0 = None															
R = Infrared															
S = Immersed Electrode															
Factory Configuration Number															
A-Z = Options															
A-Z = Options															
A-Z = Options															

2.0 COOLING CONFIGURATIONS



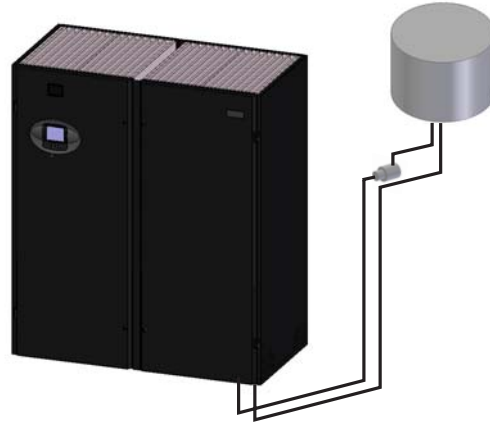
NOTE

All field-installed piping must comply with applicable local, state and federal codes.



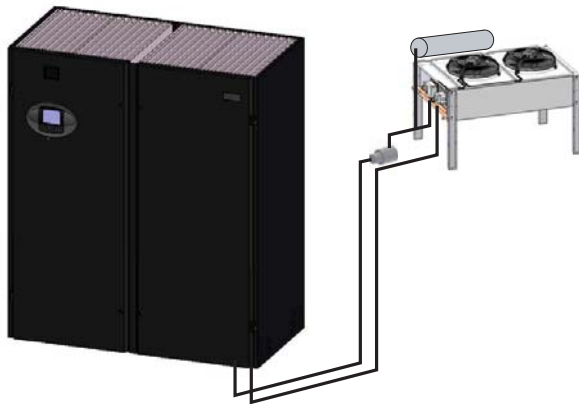
Air Cooled

Air cooled unit piping includes isolation valves from the factory and contain a nitrogen holding charge. Each installation requires refrigerant piping to a condenser.



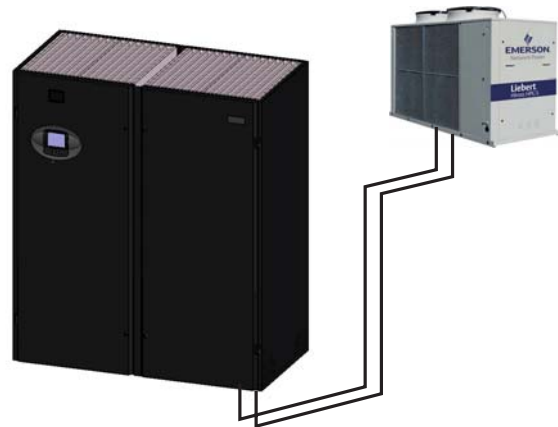
Water Cooled

Water cooled units are factory-charged. Field-installed water piping is required from the unit to the cooling tower.



Glycol Cooled

Glycol cooled units are factory-charged with refrigerant. Field-installed piping is required from the unit to the drycooler and pump package.



Chilled Water

Chilled water units are supplied with modulating control valves and supply/return pipe connections. Field-installed piping is required from the unit to an external source of chilled water.

3.0 PRE-INSTALLATION GUIDELINES

3.1 Room Preparation

- Verify the floor is level, solid and sufficient to support the unit. See tables for unit weights.
- Confirm that the room is properly insulated and has a sealed vapour barrier.
- For proper humidity control, keep outside or fresh air to an absolute minimum.
- Avoid locating units in an alcove or at the end of a long narrow room. Locate the units as close as possible to the largest heat load.
- Allow minimum recommended clearances for routine maintenance and service. See **Figures 6 through 17** for dimensions.
- An under-floor water detection system is recommended. Contact your local Emerson office for additional information.



NOTE

Liebert PEX units are supplied with a water under floor spot detector and cable.

3.2 Air Distribution

3.2.1 Downflow Units

- Verify the raised floor has been properly sized for unit airflow and is free of any unintended restrictions.
- Perforated floor tiles or aluminium air grilles in the raised floor should ensure minimal pressure loss.
- Avoid floor elevations less than 300mm (12"). Note: a minimum floor height of 400mm (15.7") is required for downflow chilled water units with EC fan option.
- Seal floor openings to maximise raised floor airflow efficiency.

3.2.2 Upflow Units

- Upflow units are available for factory plenum or field ducted operation and are manufactured to support a nominal external static pressure (ESP) specific to the selected air path - refer **Figure 5 - Liebert PEX model number nomenclature**. Due to variations in applications, a speed change may be required to obtain the desired air flow. Consult Emerson Technical Support for more information.
- Upflow units must be connected to field ductwork or factory discharge plenum with grille.
- Ensure ductwork complies with good design practice - refer **Figure 26** for recommendations.

3.3 Location Considerations

- Provide minimum 850mm (33.5") front clearance for unit servicing and component access.
- Position downflow units at the end of hot aisles for maximum efficiency.

3.4 Connections

- Plan the routing of wiring, piping and ductwork to the unit. See **Figures 30 and 36 through 55** for unit connection locations.
- The unit requires a drain, which must comply with all applicable codes. This drain line may contain boiling water. See **7.1.1 - Condensate Piping—Field-Installed** for details.
- Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. See equipment nameplate for details.

4.0 LIEBERT PEX DIMENSIONS AND WEIGHTS

Figure 6 Cabinet and floor planning dimensional data - 1 bay downflow, large frame models

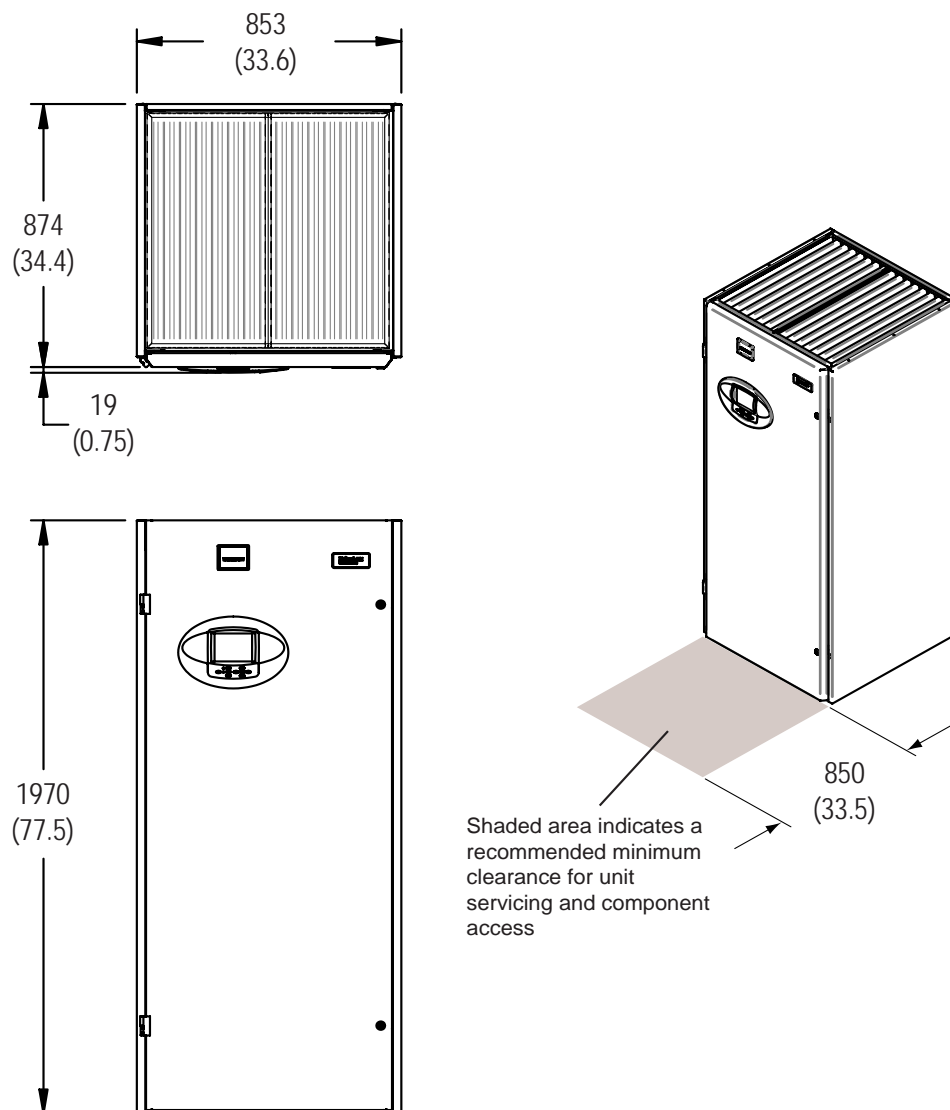
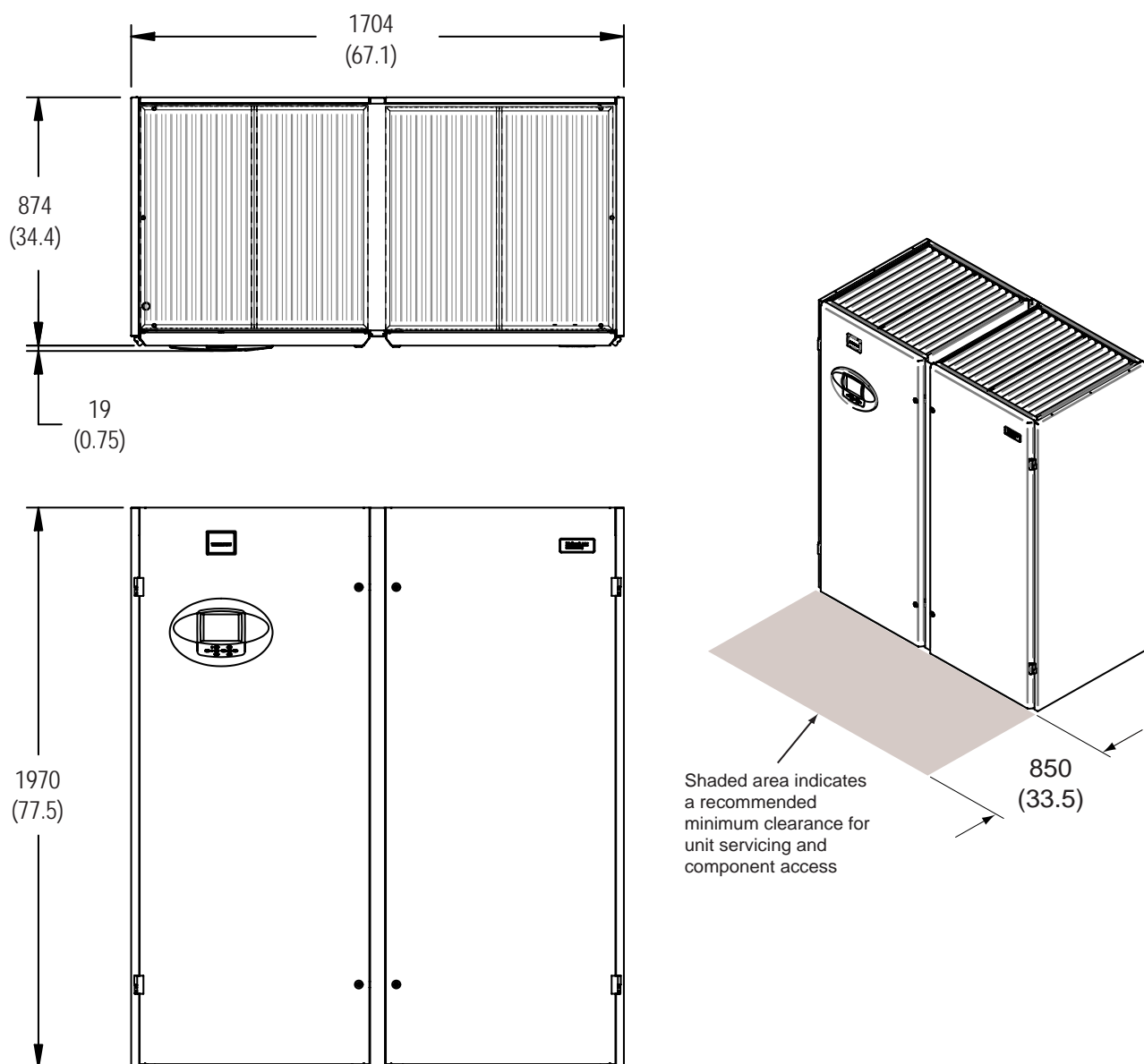


Table 1 Weights for 1 bay downflow, large frame models

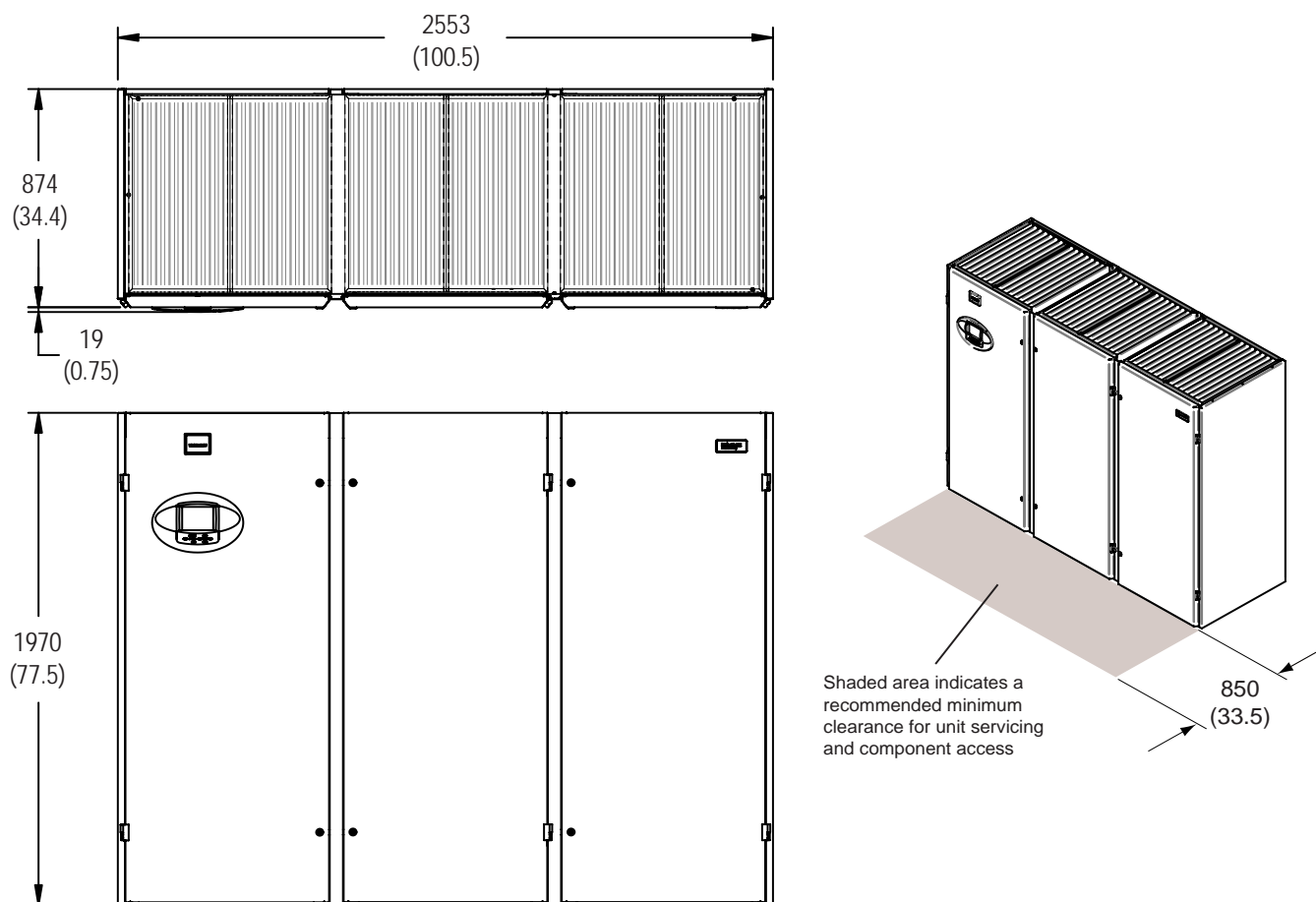
Model No.	Dry Weight - kg (lb), Approximate			
	1020FA/W/G	1025FA/W/G	1030FA/W/G	1035FA/W/G
Air Cooled	300 (660)	310 (680)	320 (700)	330 (725)
Water/Glycol Cooled	310 (680)	320 (700)	330 (725)	340 (750)

Model No.	Dry Weight - kg (lb), Approximate		
	1020FC	1030FC	1040FC
Chilled Water	260 (570)	260 (570)	270 (595)

Figure 7 Cabinet and floor planning dimensional data - 2 Bay downflow, large frame models**Table 2 Weights for 2 bay downflow, large frame models**

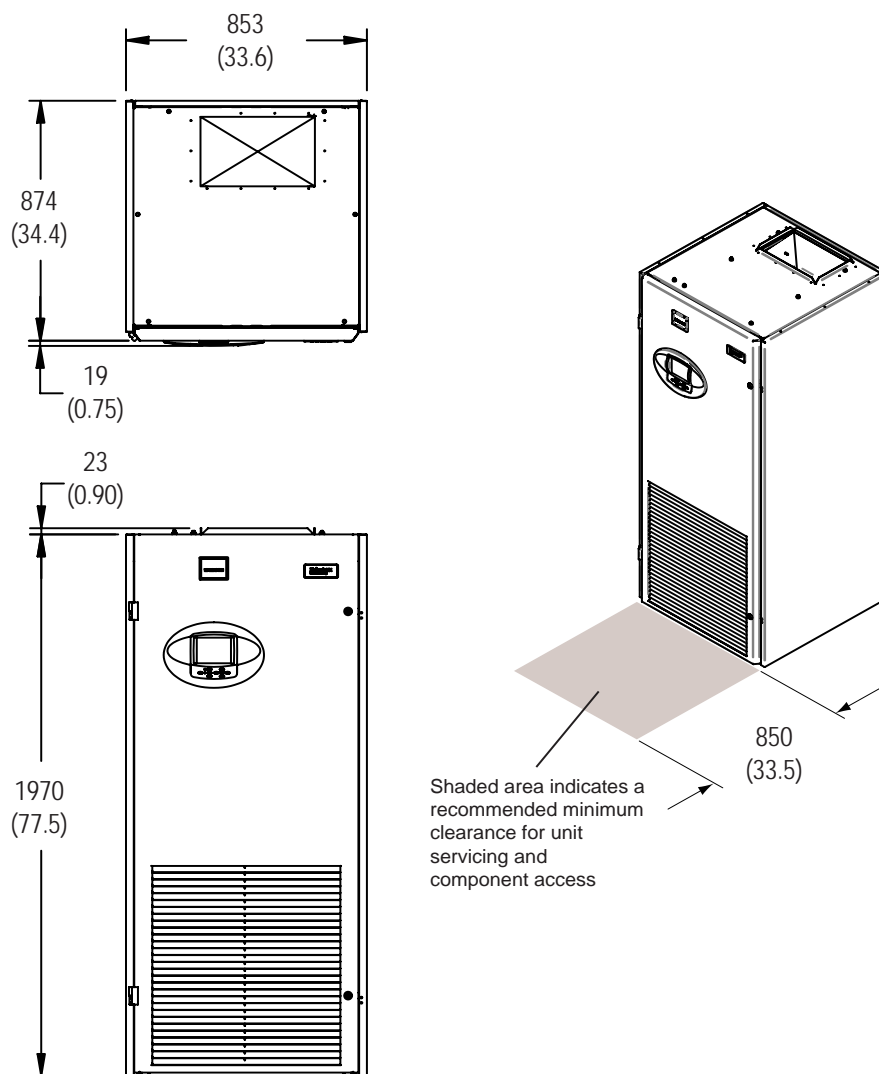
Model No.	Dry Weight - kg (lb), Approximate					
	2045 FA/W/G	2055 FA/W/G	2040 FA/W/G	2050 FA/W/G	2060 FA/W/G	2070 FA/W/G
Air Cooled	520 (1145)	530 (1165)	540 (1190)	560 (1230)	590 (1300)	600 (1320)
Water/Glycol Cooled	540 (1190)	550 (1210)	570 (1255)	590 (1300)	620 (1365)	630 (1385)

Model No.	Dry Weight - kg (lb), Approximate		
	2050FC	2070FC	2090FC
Chilled Water	480 (1055)	480 (1055)	500 (1100)

Figure 8 Cabinet and floor planning dimensional data - 3 bay downflow, large frame models**Table 3 Weights for 3 bay downflow, large frame models**

Model No.	Dry Weight - kg (lb), Approximate		
	3080FA/W/G	3090FA/W/G	3100FA/W/G
Air Cooled	840 (1850)	860 (1890)	880 (1935)
Water/Glycol Cooled	880 (1935)	900 (1980)	920 (2025)

Model No.	Dry Weight - kg (lb), Approximate	
	3110FC	3140FC
Chilled Water	710 (1560)	730 (1605)

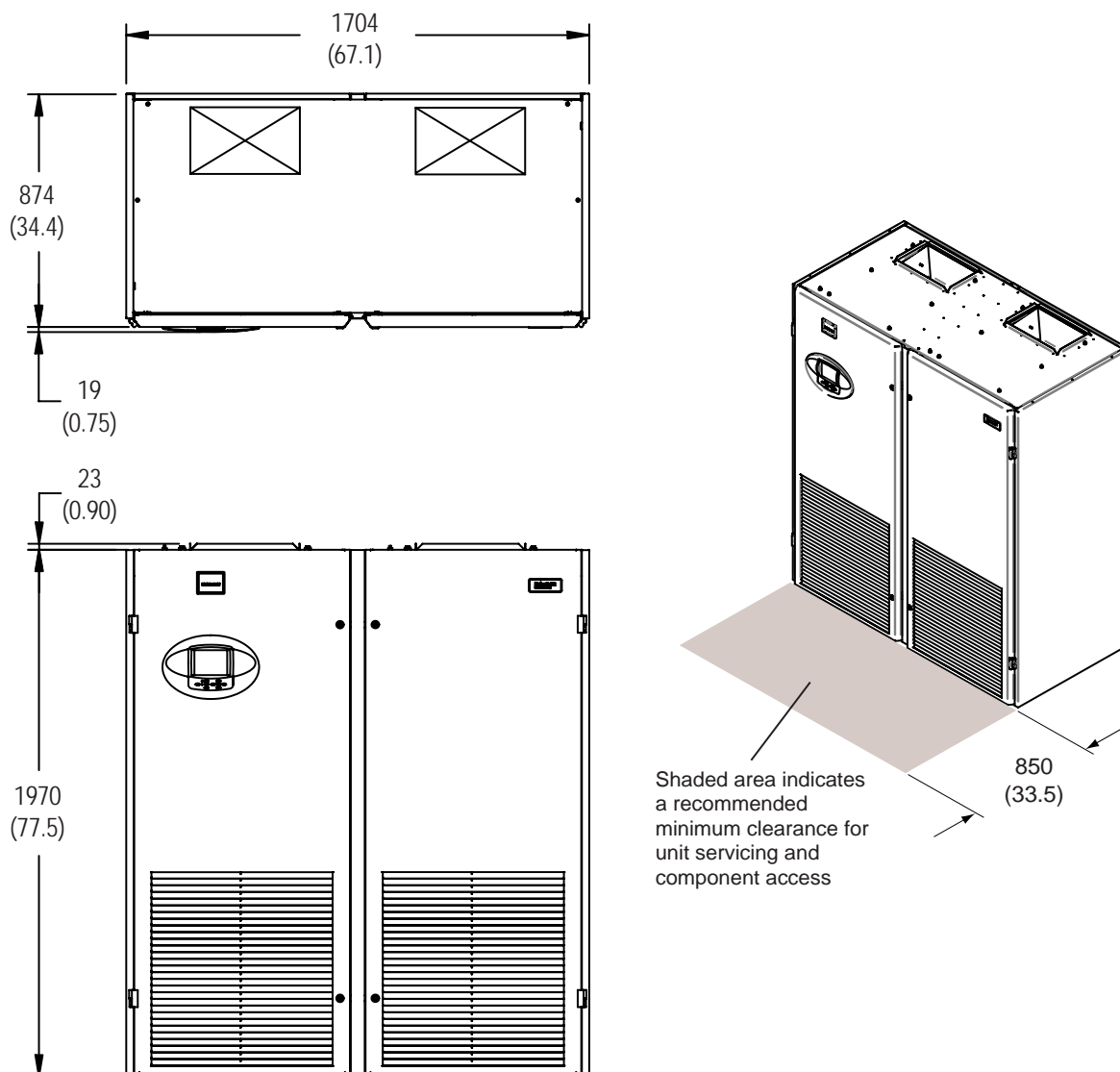
Figure 9 Cabinet and floor planning dimensional data - 1 bay upflow, large frame models

Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 4 Weights for 1 bay upflow, large frame models

Model No.	Dry Weight - kg (lb), Approximate		
	1020UA/W/G	1025UA/W/G	1030UA/W/G
Air Cooled	310 (680)	320 (700)	330 (725)
Water/Glycol Cooled	320 (700)	330 (725)	340 (750)

Model No.	Dry Weight - kg (lb), Approximate	
	1020UC	1030UC
Chilled Water	270 (595)	270 (595)

Figure 10 Cabinet and floor planning dimensional data - 2 bay upflow, large frame models

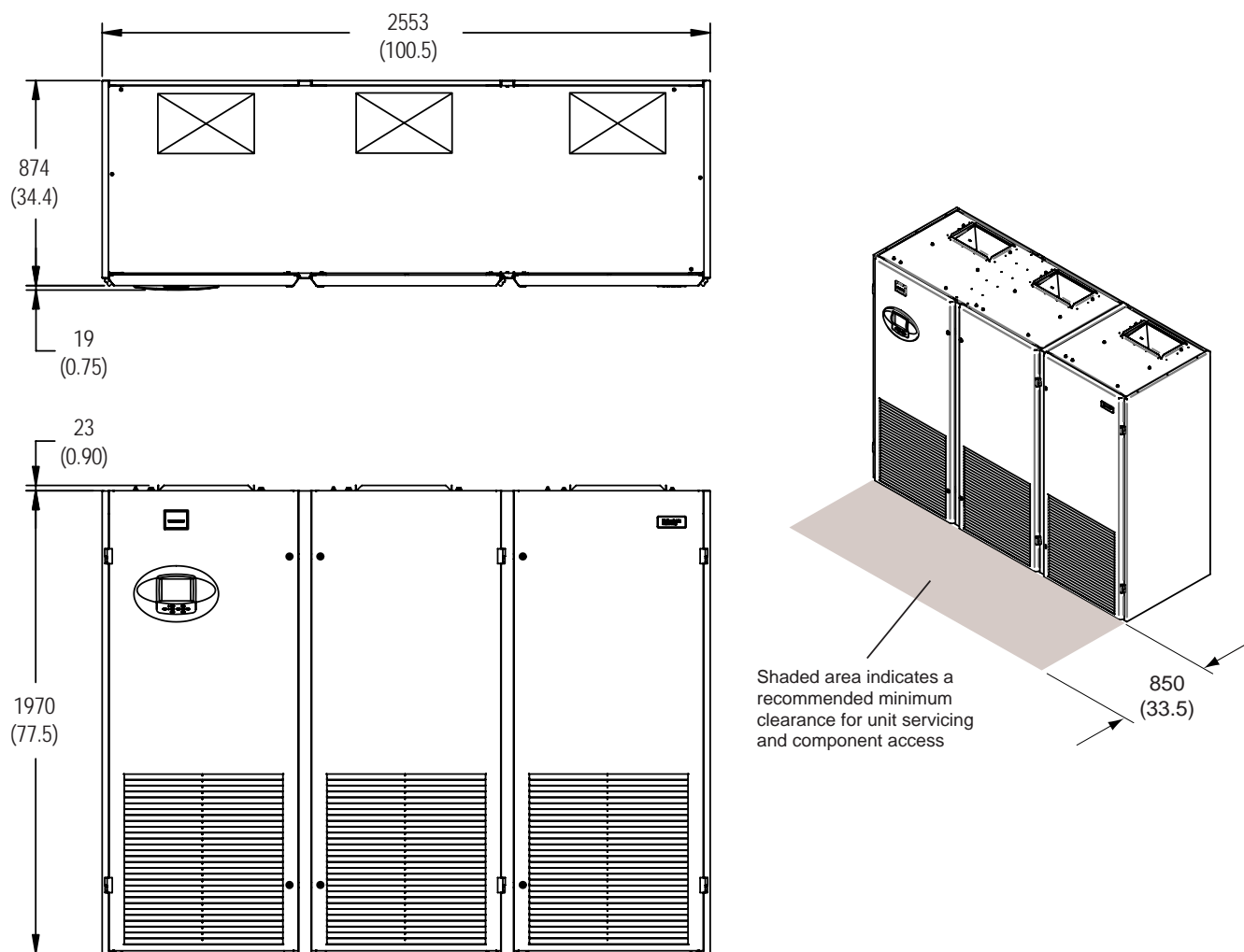
Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 5 Weights for 2 bay upflow, large frame models

Model No.	Dry Weight - kg (lb), Approximate					
	2045 UA/W/G	2055 UA/W/G	2040 UA/W/G	2050 UA/W/G	2060 UA/W/G	2070 UA/W/G
Air Cooled	540 (1190)	550 (1210)	560 (1230)	580 (1275)	610 (1340)	620 (1365)
Water/Glycol Cooled	560 (1230)	570 (1255)	590 (1300)	610 (1340)	640 (1410)	650 (1430)

Model No.	Dry Weight - kg (lb), Approximate	
	2050UC	2070UC
Chilled Water	500 (1100)	500 (1100)

Figure 11 Cabinet and floor planning dimensional data - 3 bay upflow, large frame models



Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 6 Weights for 3 bay upflow, large frame models

Model No.	Dry Weight - kg (lb), Approximate		
	3080UA/W/G	3090UA/W/G	3100UA/W/G
Air Cooled	870 (1915)	890 (1960)	910 (2000)
Water/Glycol Cooled	910 (2000)	930 (2045)	950 (2090)

Model No.	Dry Weight - kg (lb), Approximate	
	3080UC	3110UC
Chilled Water	730 (1605)	730 (1605)

Figure 12 Cabinet and floor planning dimensional data - 1 bay downflow, large frame EC fan models

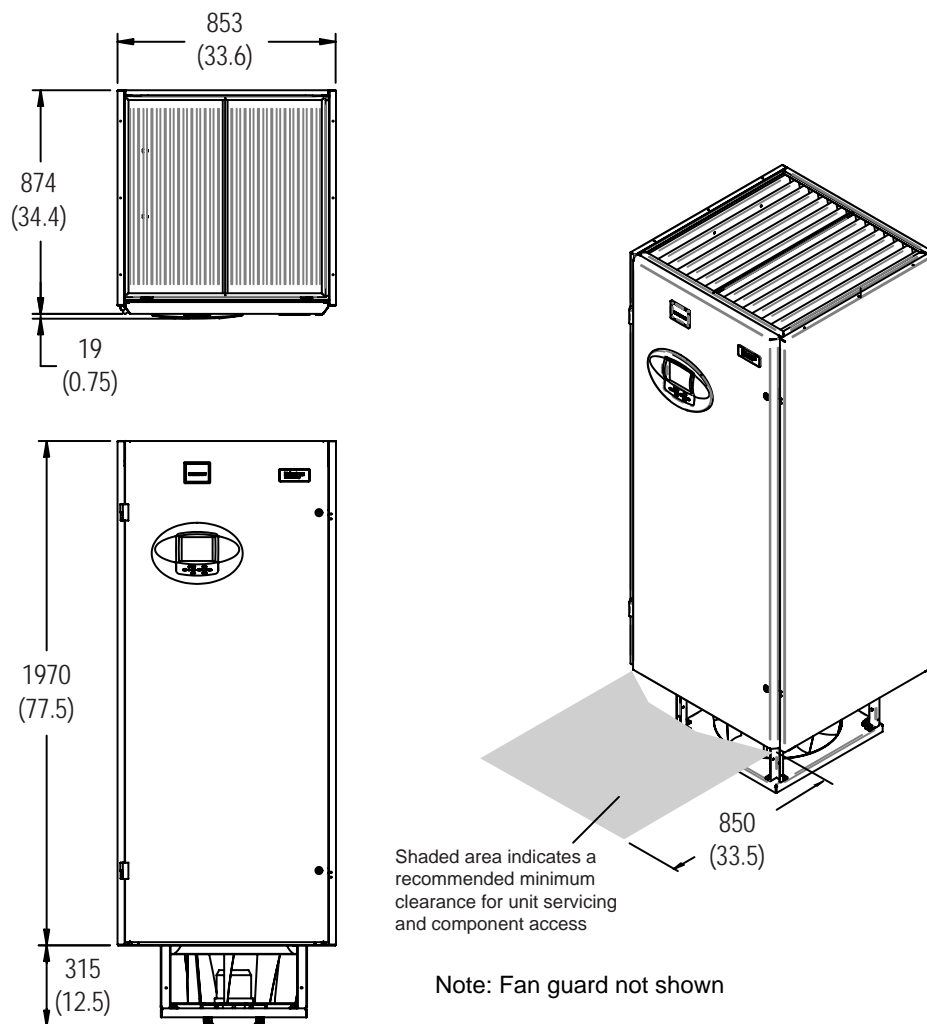
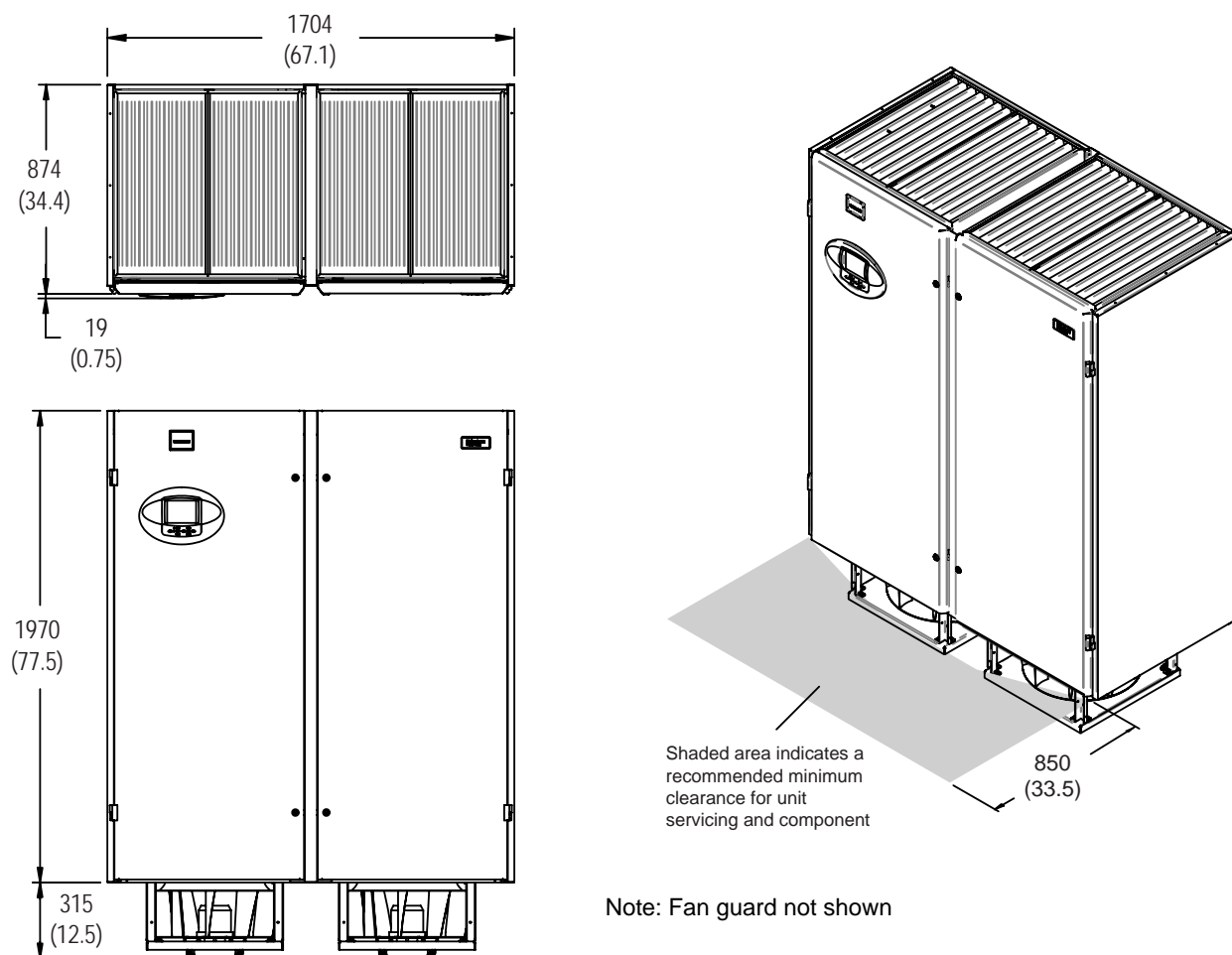


Table 7 Weights for 1 bay downflow, large frame EC fan models

Model No.	Dry Weight - kg (lb), Approximate		
	1020GC	1030GC	1040GC
Chilled Water EC	270 (595)	270 (595)	280 (615)

Figure 13 Cabinet and floor planning dimensional data - 2 bay downflow, large frame EC fan models**Table 8 Weights for 2 bay downflow, large frame EC fan models**

Model No.	Dry Weight - kg (lb), Approximate		
	2050GC	2070GC	2090GC
Chilled Water EC	500 (1100)	500 (1100)	520 (1145)

Figure 14 Cabinet and floor planning dimensional data - 3 bay downflow, large frame EC fan models

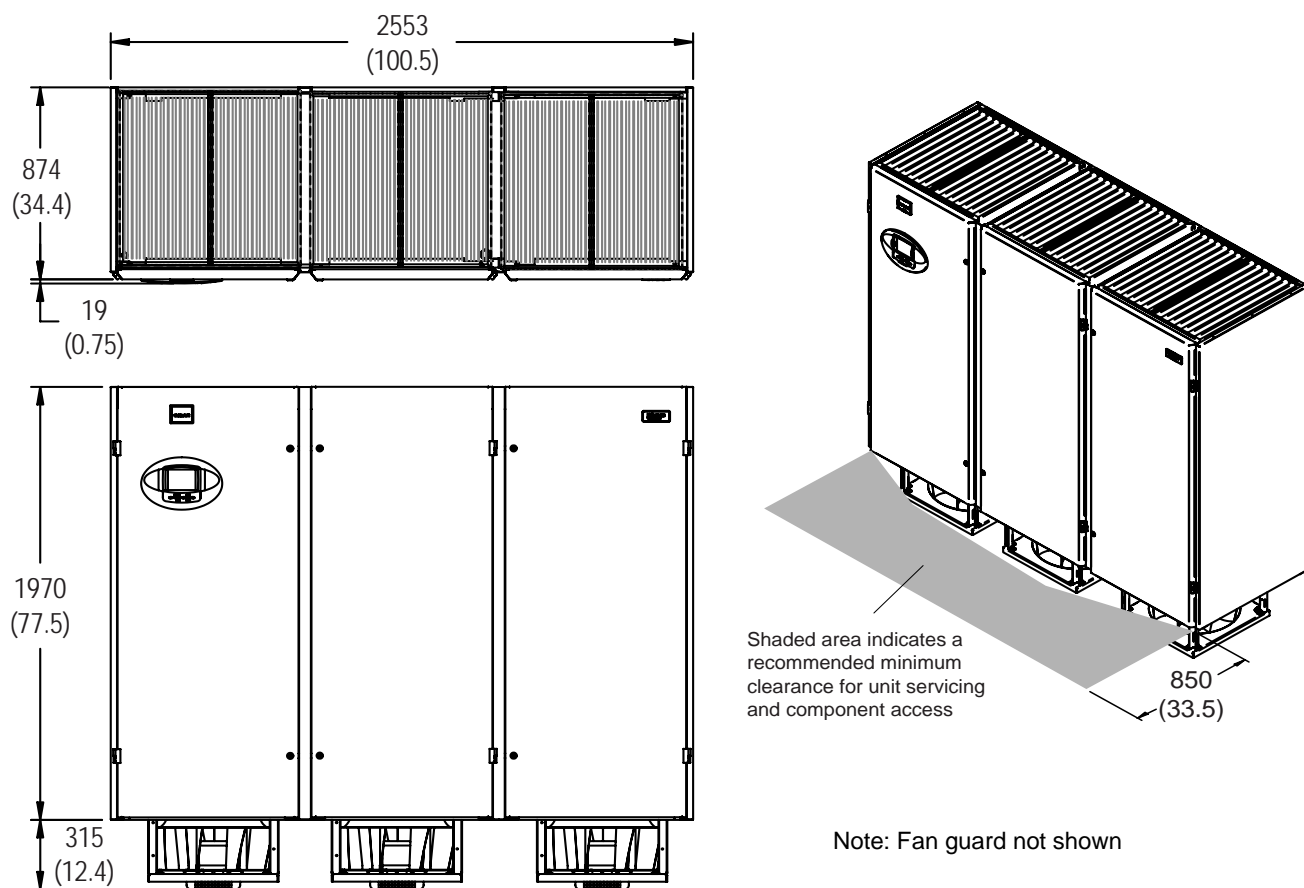
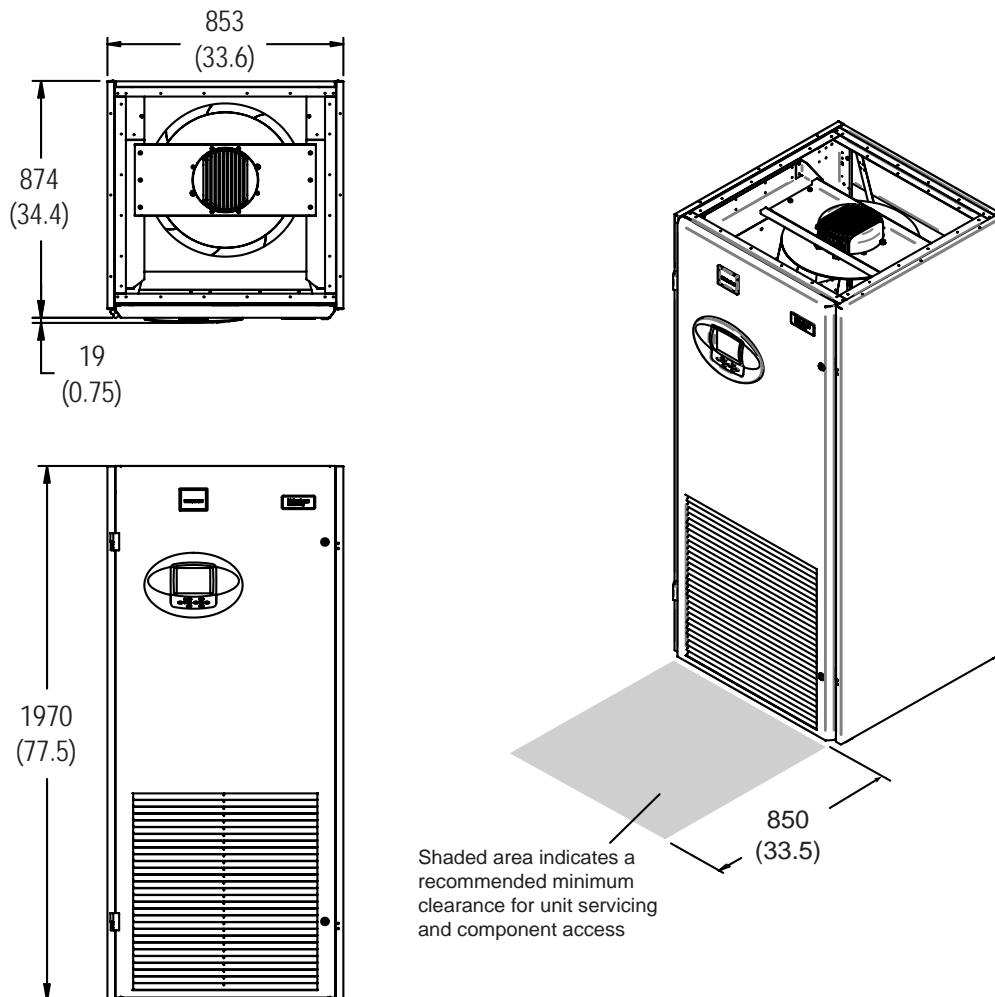


Table 9 Weights for 3 bay downflow, large frame EC fan models

Model No.	Dry Weight - kg (lb), Approximate	
	3110GC	3140GC
Chilled Water EC	740 (1630)	760 (1670)

Figure 15 Cabinet and floor planning dimensional data - 1 bay upflow, large frame EC fan models

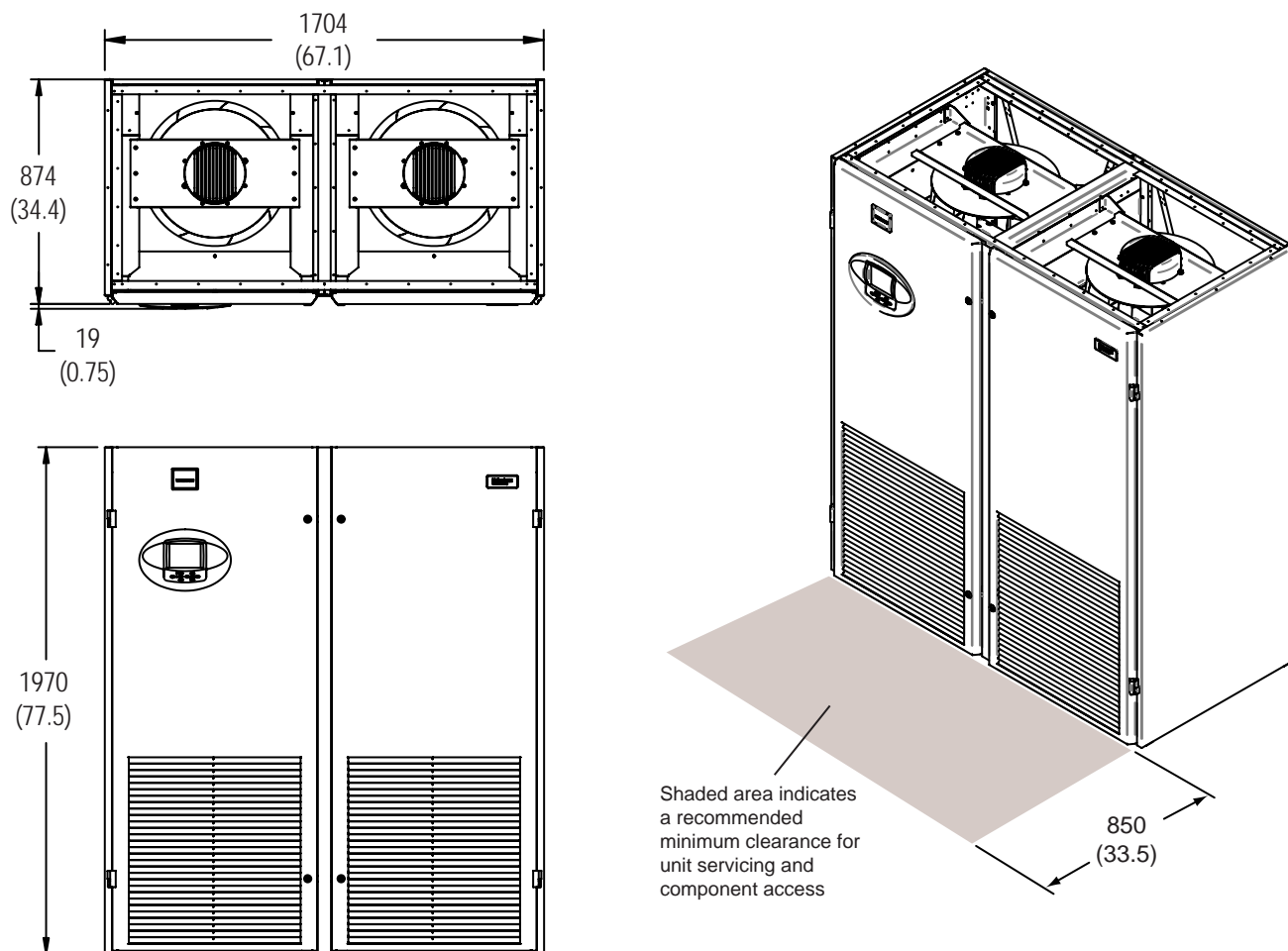


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 10 Weights for 1 bay upflow, large frame EC fan models

Model No.	Dry Weight - kg (lb), Approximate	
	1020VC	1030VC
Chilled Water EC	270 (595)	270 (595)

Figure 16 Cabinet and floor planning dimensional data - 2 bay upflow, large frame EC fan models

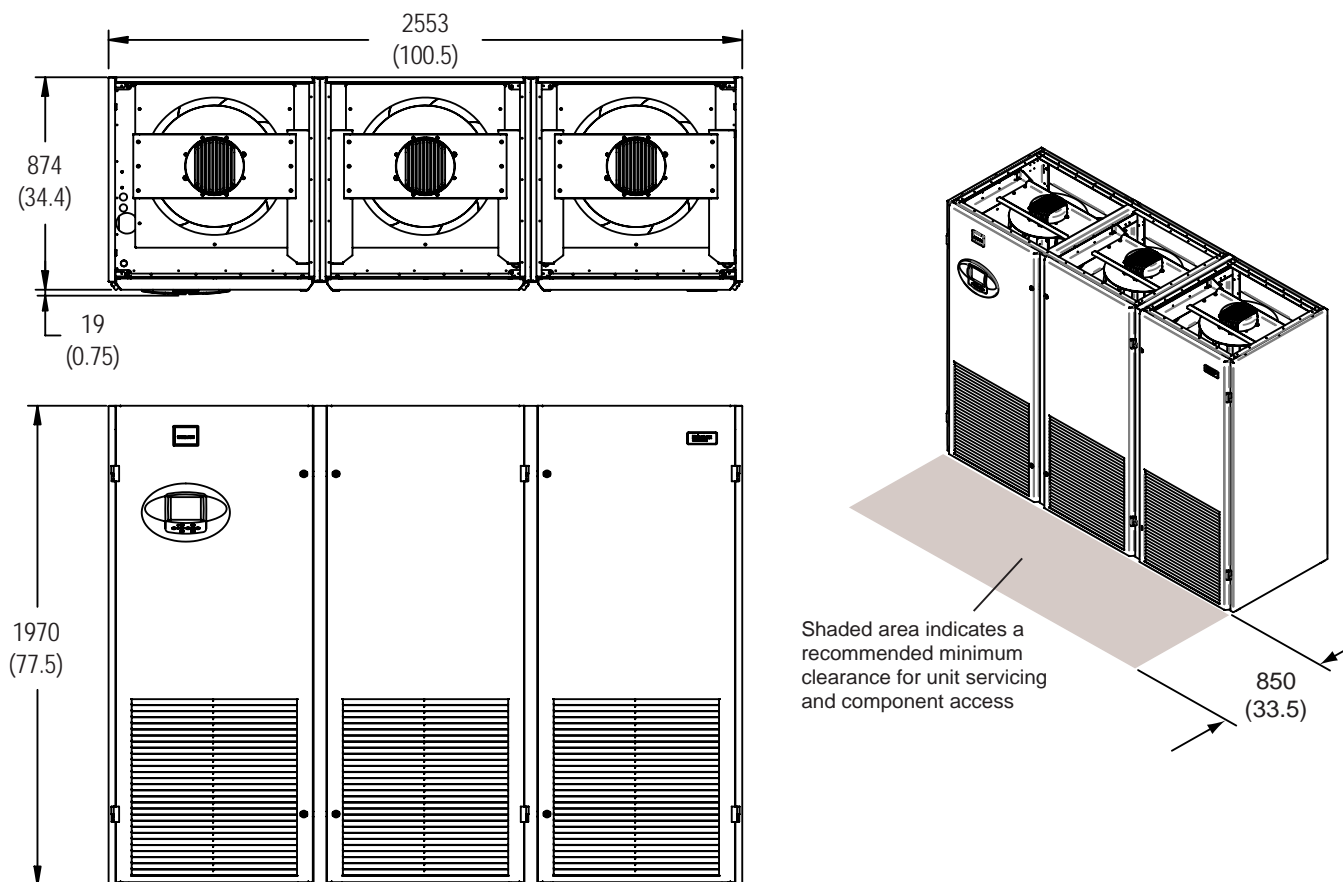


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 11 Weights for 2 bay upflow, large frame EC fan models

Model No.	Dry Weight - kg (lb), Approximate	
	2050VC	2070VC
Chilled Water EC	520 (1145)	520 (1145)

Figure 17 Cabinet and floor planning dimensional data - 3 bay upflow, large frame EC fan models



Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Table 12 Weights for 3 bay upflow, large frame EC fan models

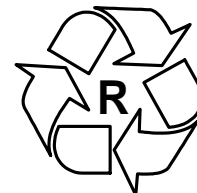
Model No.	Dry Weight - kg (lb), Approximate	
	3080VC	3110VC
Chilled Water EC	760 (1670)	760 (1670)

5.0 EQUIPMENT INSPECTION AND HANDLING

Upon arrival of the unit and before unpacking it, verify that the labeled equipment matches the bill of lading. Carefully inspect all items for damage, either visible or concealed. For initial access use a flat-bladed screwdriver for panel removal. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Emerson or to your sales representative.

5.1 Packaging Material

All material used to package this unit is recyclable. Please save for future use or dispose of the material appropriately.



SAFETY INFORMATION



WARNING

Risk of top-heavy unit falling over. Can cause equipment damage, injury or death.

Read all of the following instructions before attempting to move the unit, lift it, remove packaging or prepare the unit for installation.



CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move the unit, lift it, remove packaging or prepare the unit for installation.



CAUTION

Risk of overhead interference. Can cause unit and/or structure damage.

The unit may be too tall to fit through a doorway while on the pallet. Measure the unit and doorway heights and refer to the installation plans to verify clearances prior to moving the unit.



CAUTION

Risk of damage from forklift. Can cause exterior and/or underside damage.

Keep tines of the forklift level and at a height suitable to fit below the pallet and/or unit.

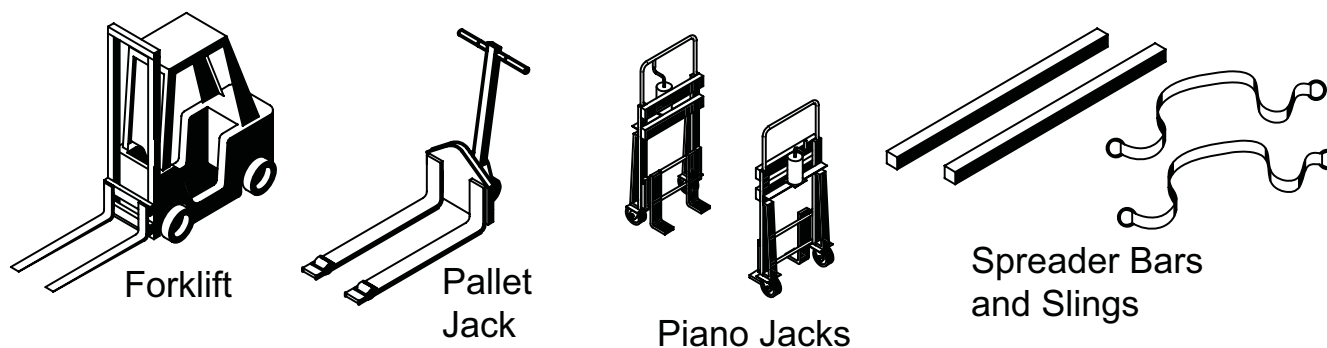


CAUTION

Risk of improper storage. Can cause unit damage.

Keep the unit upright, indoors and protected from dampness, freezing temperatures and contact damage.

Figure 18 Equipment recommended for handling Liebert PEX



If possible, transport the Liebert PEX with a forklift or pallet jacks. If that is not possible, use a crane with belts or cables, slings and spreader bars.

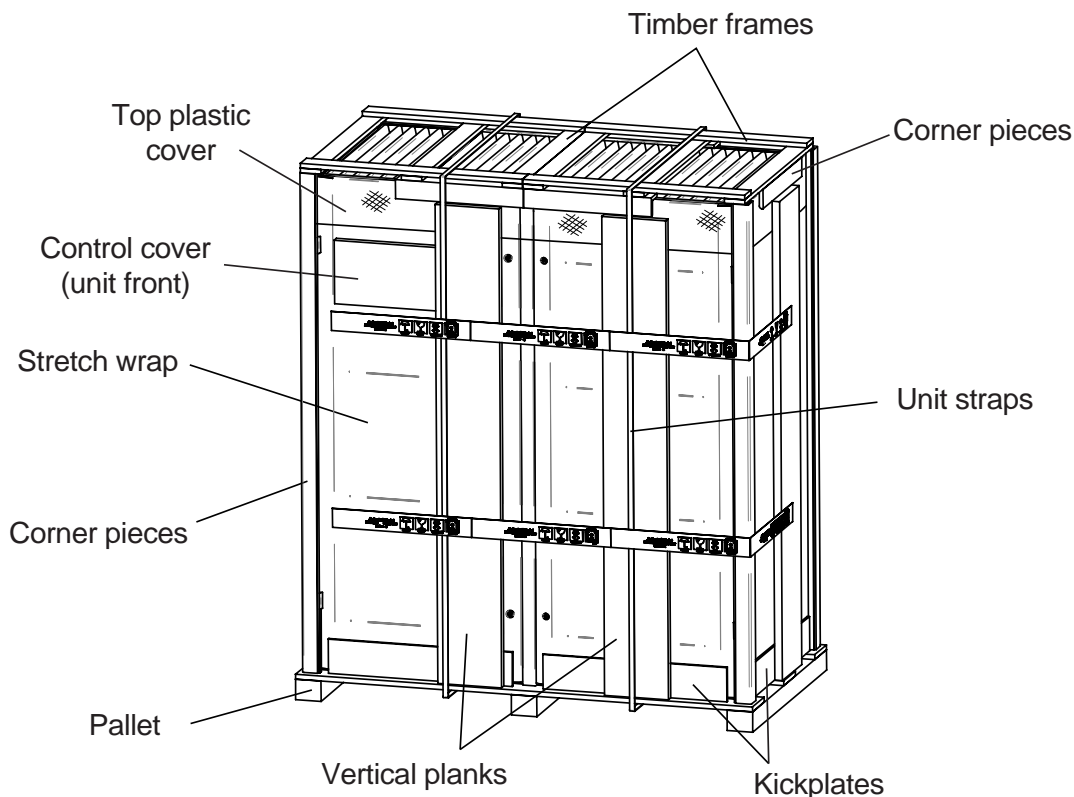
- If using a forklift or pallet jack, make sure that the forks (if adjustable) are spread to the widest allowable distance that will fit under the pallet.
Ensure the fork length is suitable for the unit length.
- When moving the packaged Liebert PEX with a forklift, carefully lift the unit centrally and no higher than 150mm (6") off the ground.
- If the unit must be lifted higher than 150mm (6"), great care must be exercised: Personnel who are not directly involved in moving the unit must be kept 5m (20') or farther from the lift point of the unit..

5.2 Unpacking the Unit

Remove outer packaging when ready to install the unit.

- Identify the unit front by locating the styrene control cover.
- Remove the unit straps, packing tape and exterior stretch wrap packaging material from around the unit, exposing the protective corner and vertical styrene packaging planks.
- Remove the timber frame packing, corner pieces and plastic cover from the unit top.
- Remove the balance of the stretch wrap packaging, styrene planks and kickplates from the unit.

Figure 19 Removing packaging



5.2.1 Removing the Unit from the pallet With a Forklift

1. Align a forklift with either the front or rear side of the unit.



WARNING

Risk of improper moving. Can cause equipment damage, injury or death.

The center of gravity varies depending on the unit size and selected options.

2. Insert the tines of the forklift completely under the base of the Liebert PEX.



WARNING

Risk of improper moving. Can cause equipment damage, injury or death.

Ensure that the tines are level, not angled up or down.

The tines must be at a height that will allow proper clearance under the unit.

Ensure the tines extend beyond the opposite side of the unit.

3. Remove the lag bolts from each bracket holding the Liebert PEX to the pallet.
4. Lift the unit off the pallet—no more than 150mm (6")—and remove the pallet.

5.2.2 Moving the Unit to the Installation Location with Piano Jacks

1. With the Liebert PEX elevated, place two piano jacks into position—one at either end of the unit.
2. Lower the Liebert PEX to a height suitable for the piano jacks and place protective material between the Liebert PEX and the piano jacks.
3. Secure the unit to the piano jacks and remove the forklift.
4. Use the piano jacks to move the Liebert PEX for installation.

5.2.3 Removing Piano Jacks

1. Lower the unit as much as the piano jacks will allow.
2. Undo all strapping holding the piano jacks to the unit.
3. Use a pry bar or similar device to lift one end of the unit just enough to allow removal of the piano jack from that end.
4. Repeat **Step 3** to remove the piano jack on the opposite end.
5. Remove all material that might have been used to protect the unit from the piano jacks and strapping.

5.2.4 Removing Liebert PEX from pallet Using Rigging



WARNING

Risk of improper moving. Can cause equipment damage, injury or death.

The center of gravity varies depending on the unit size and selected options.

1. Remove unit packaging and access the unit internals.
2. Remove all M8 shipping bolts securing the Liebert PEX to the pallet. Do NOT discard.
3. Space the slings equidistant on the unit.
4. Place the slings between the bottom rails of the Liebert PEX and the top of the pallet.
5. Use spreader bars or a similar device and padding to ensure the Liebert PEX will not be damaged when the unit is lifted. Lifting will force the slings toward the Liebert PEX and the slings may damage the unit unless it is properly protected.



NOTE

Depending on final installation location, the pallet may need to remain under the unit. Therefore, the shipping bolts would not yet be removed.

6. Lift the Liebert PEX off the pallet.
7. Move the pallet from under the unit.

5.3 Placing the Unit on a Floor Stand

Emerson Floor Stand—Ensure that the floor stand is orientated correctly prior to placing the unit. Level the floor stand by adjusting the feet. The use of waffle pad between the unit baseplate and floor stand is recommended. Lower the unit onto the floor stand and align the unit baseplate with the floor stand frame. The shipping bolt holes in the baseplate should align with matching holes in the floor-stand frame. Refit the M8 shipping bolts in the baseplate and secure to the floor stand frame.

Figure 20 Floor Stand Arrangement - Downflow units, forward curve fan

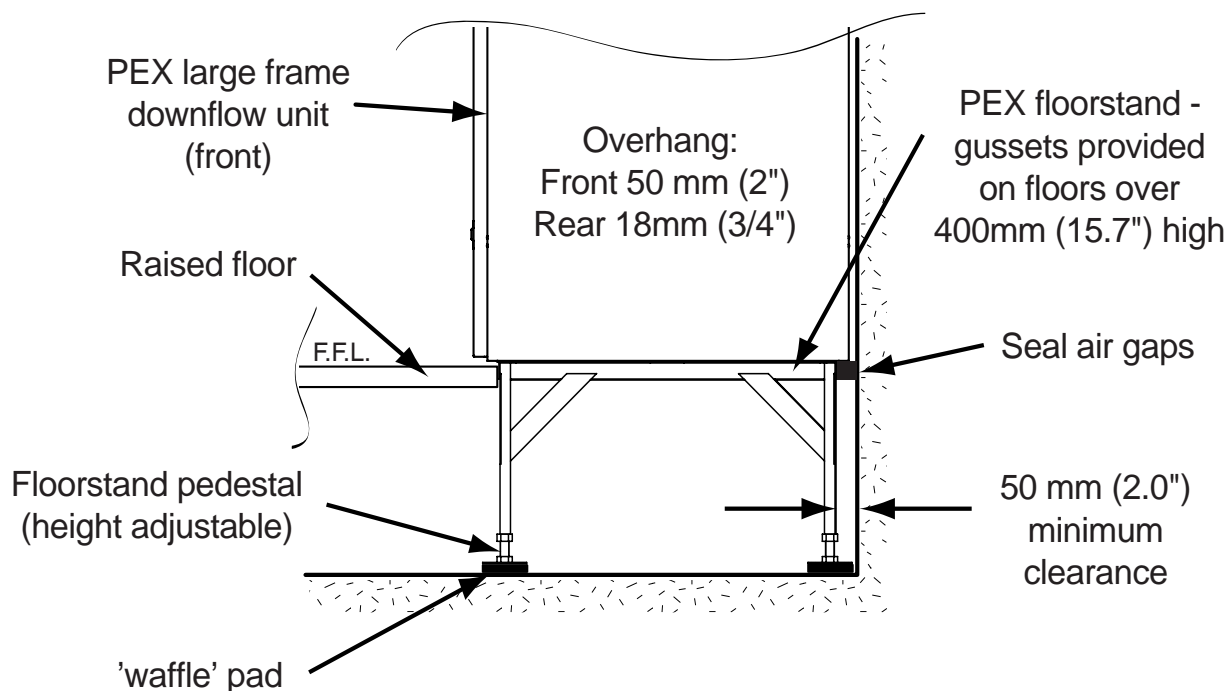
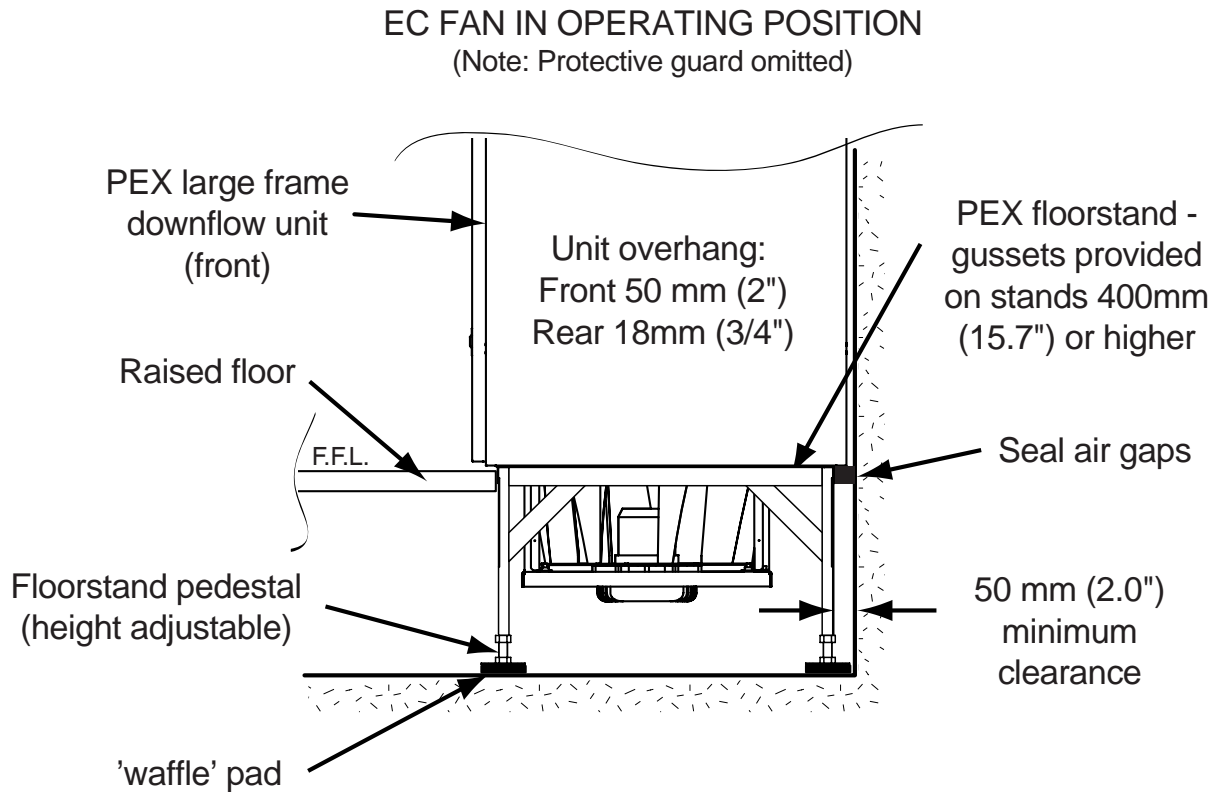


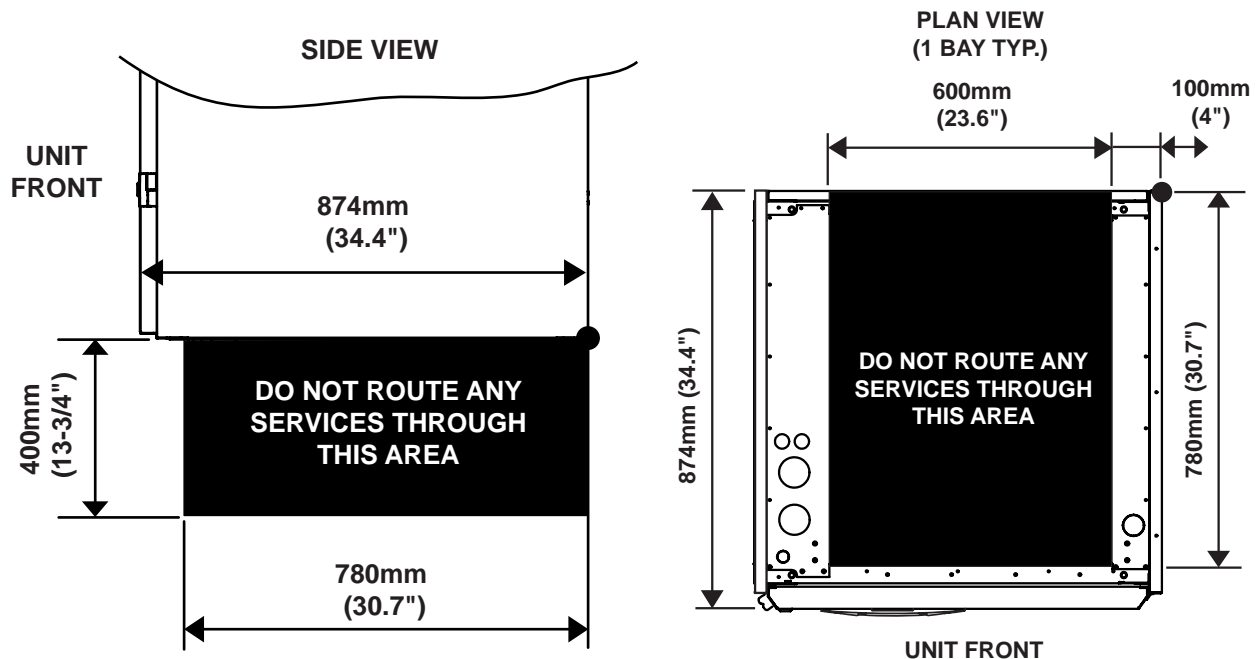
Figure 21 Floor Stand Arrangement - Downflow chilled water units (EC fan option)



5.3.1 Downflow Chilled Water Units with EC Fan Option

The optional EC fans are shipped in the 'transport position' and must not be operated until they are secured in the 'operating position' within the raised floor space. Each fan assembly frame is pivoted to allow easy installation and removal from the front of the unit using the supplied installation handle mounted inside the rear of the unit. Each fan frame is fitted with a protective guard.

Figure 22 Minimum clearance requirements for EC Fan Installation



EC Fan Installation Procedure



WARNING

Risk of crushing and pinching action from pivoting fan motor assembly. Can cause serious injury to hands and fingers.

Do not remove installation handle from unit. Return to storage position when not in use.

Fan motor assembly mass approximately 50kg (110lb.).

1. Locate the installation handle and M8 fixing screws in the rear of the unit, and attach the handle to the fan plate in location A (refer **Figure 23**) using the same screws. Refer to Position 1 in **Figure 24**.
2. Place downward pressure on the installation handle and remove the shipping plate that secures the fan in the transport position. Retain the 6 fasteners.
3. Slowly raise the installation handle to lower the fan assembly into operating position.
4. Locate the filler plate, stowed with the installation handle, and fit between the fan deck and rear panel using the fasteners removed in Step 2.

Figure 23 Installation handle fixing locations

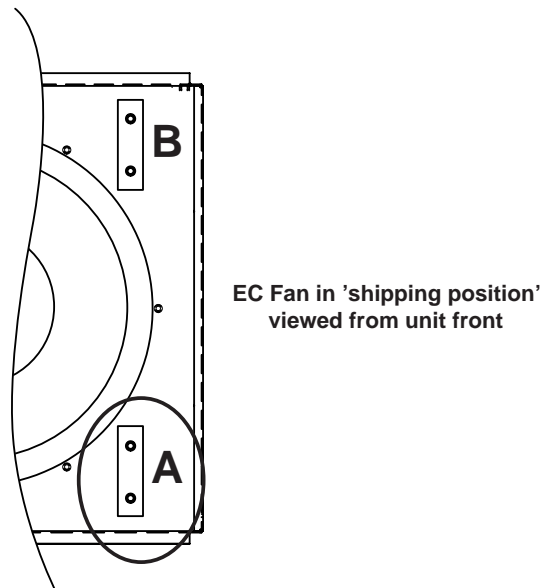


Figure 24 Lowering EC fan motor into operating position

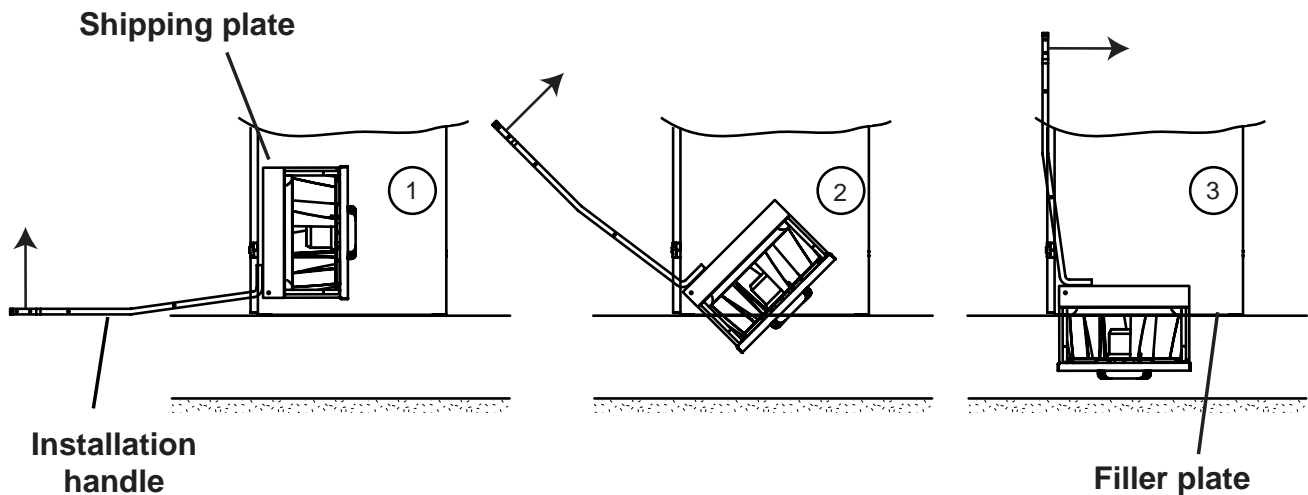


Figure 25 Floorstand orientation & base plate fixing details

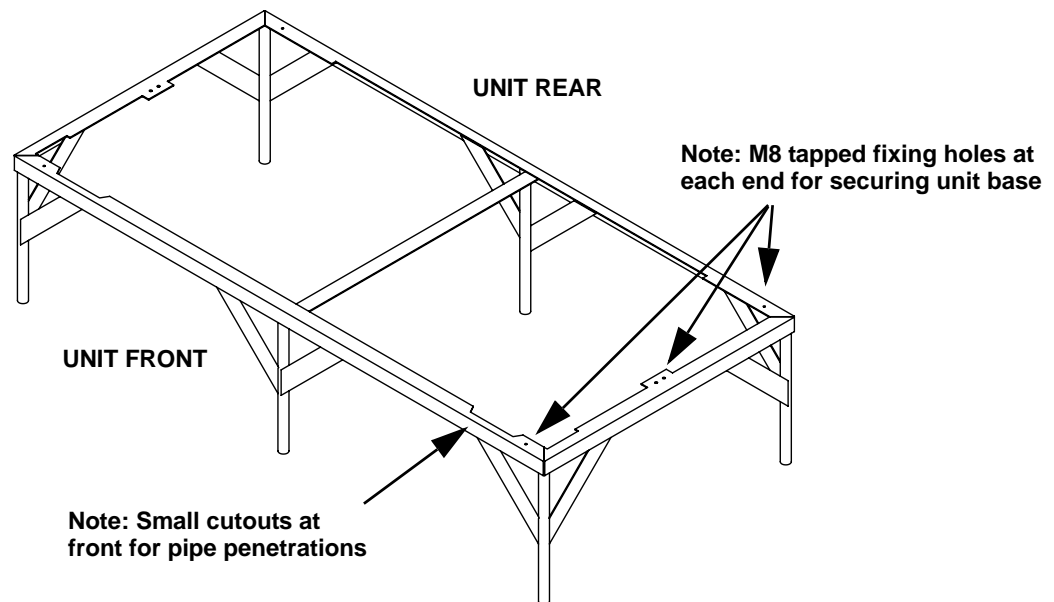
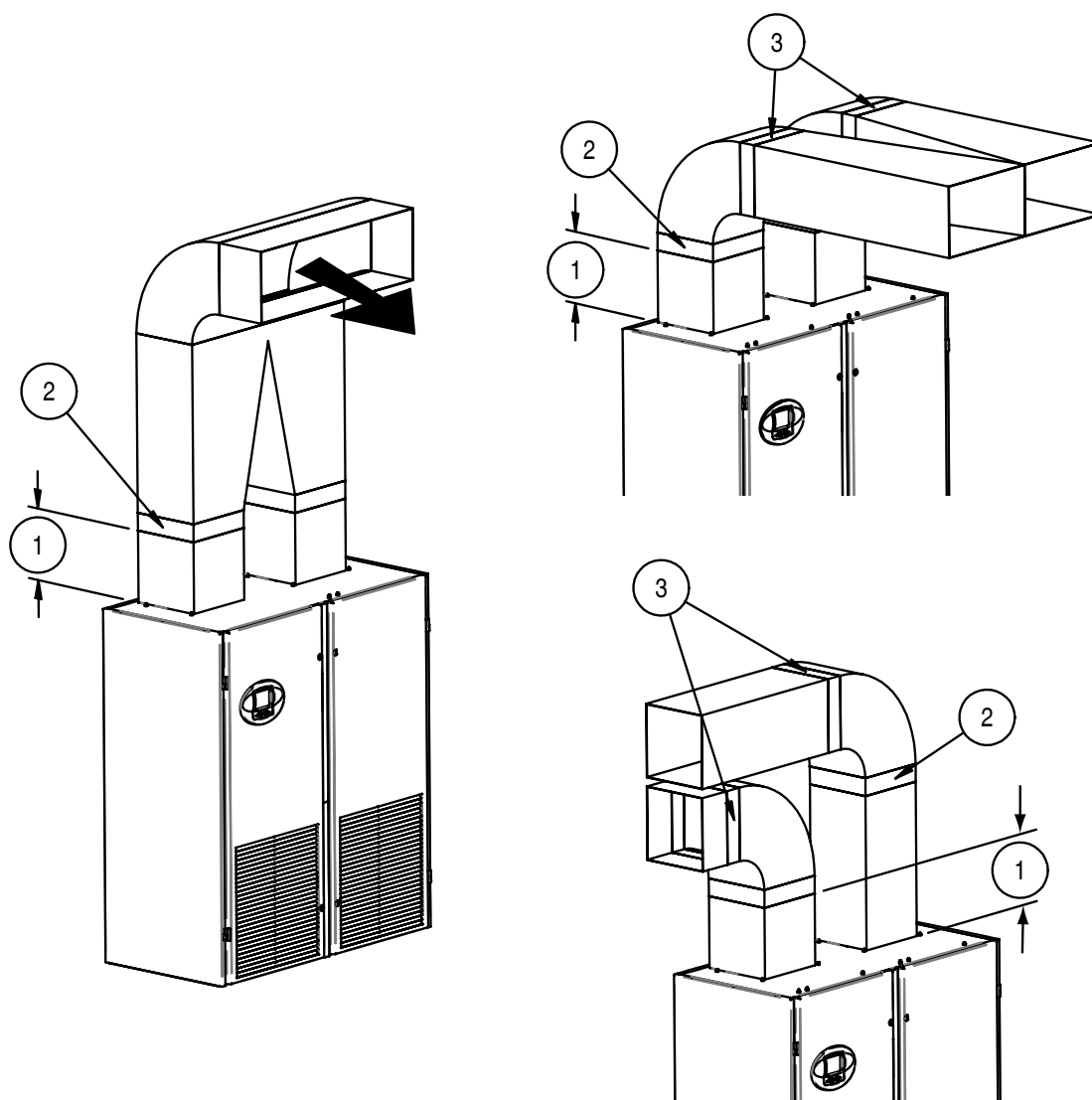


Figure 26 Upflow ducting configurations - forward curve fan systems, type D air path



- 1 Straight section of duct off unit to be min. 600mm
- 2 Recommended damper location
- 3 Alternate damper location

* Follow standard practices on all duct work.

Figure 27 Duct connection details - forward curve fan systems, type D air path

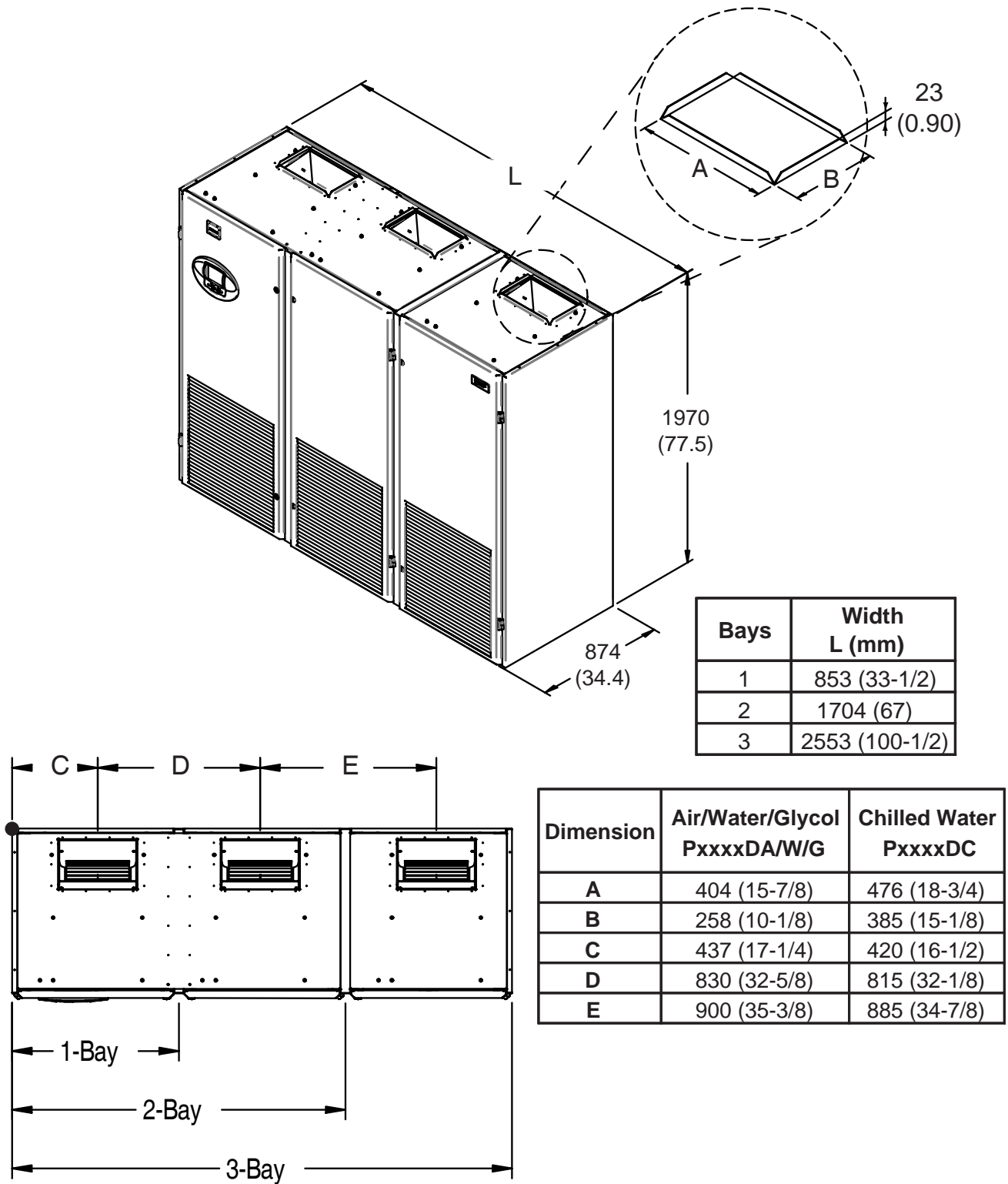


Figure 28 Duct connection details - backward curve(EC) fan systems, type V air path

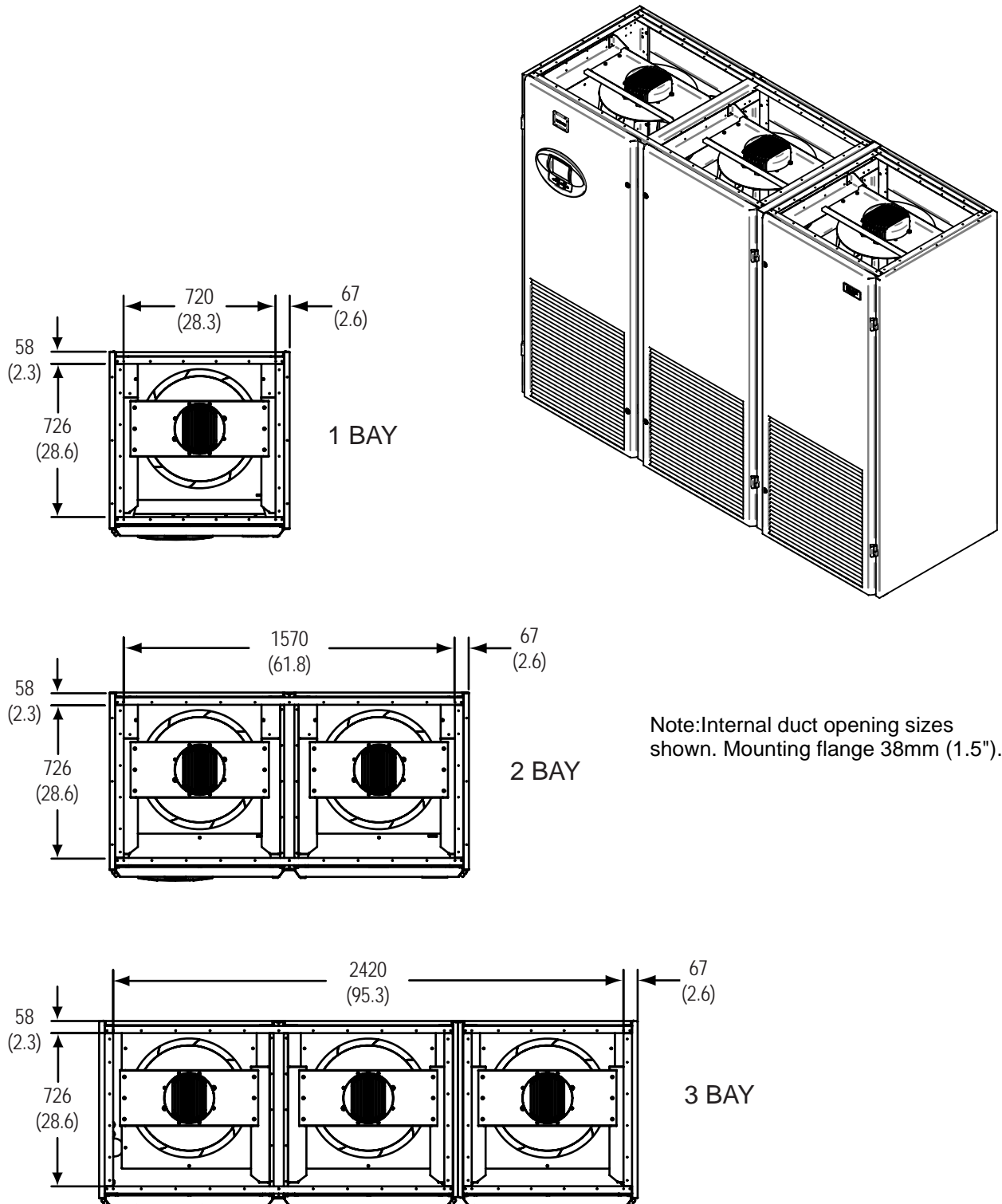
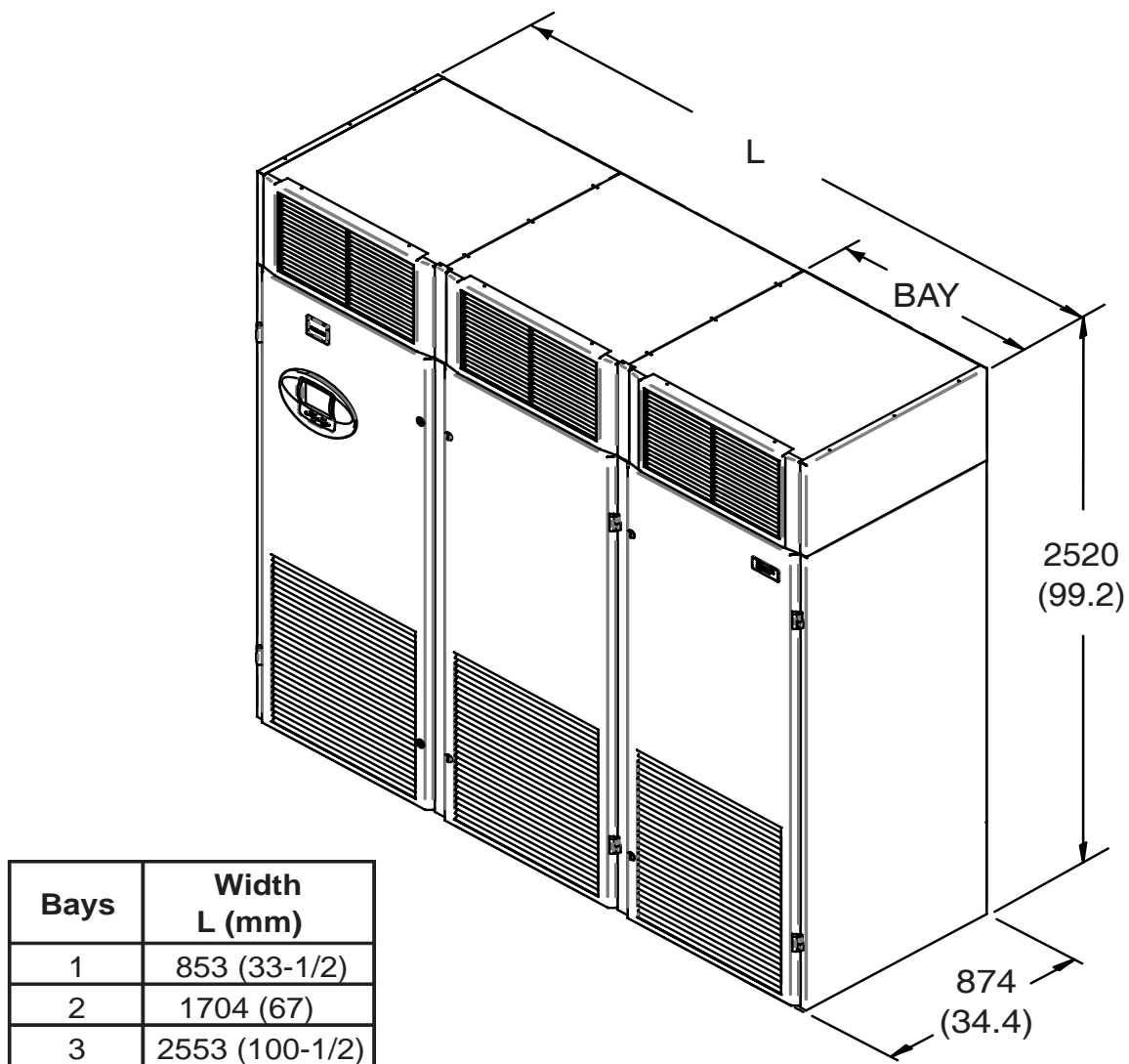


Figure 29 Plenum discharge details - forward curve fans, type U and V air path



550 high plenum shown is optional

6.0 ELECTRICAL CONNECTIONS

Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. Refer to equipment nameplate for unit full load amps. Refer to electrical schematic when making connections. Refer to **Figure 30** for electrical service entrances into unit.

A manual electrical isolation switch should be installed in accordance with local codes and distribution system. Consult local codes for external isolation requirements.



WARNING

Risk of electric shock. Can cause injury or death.

Disconnect local and remote power supplies before working within.

Use voltmeter to make sure power is turned off before making any electrical connections.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.



WARNING

Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, injury or death.

Installation and service of this equipment should be done only by qualified personnel who have been specially trained in the installation of air conditioning equipment.



CAUTION

Risk of backward compressor rotation. Can cause equipment damage.

Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that scroll compressors rotate in the proper direction.



CAUTION

Risk of improper electrical supply connection. Can cause equipment damage.

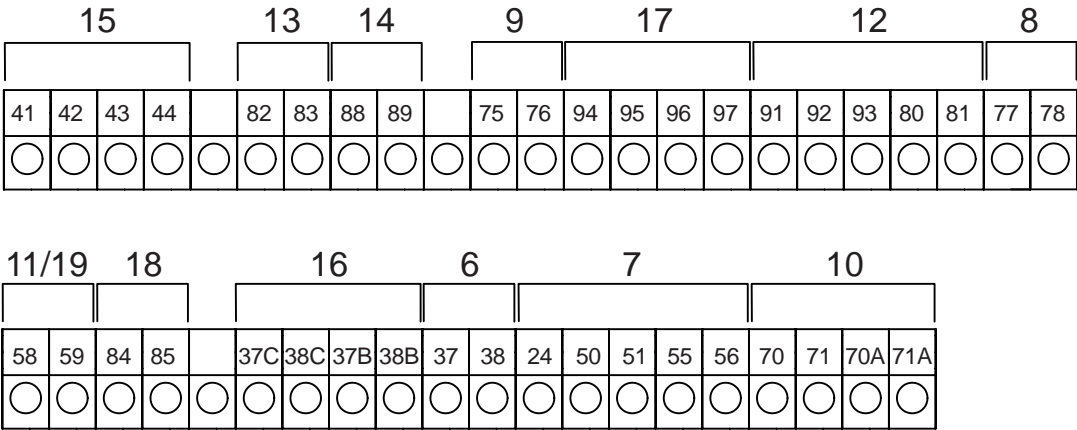
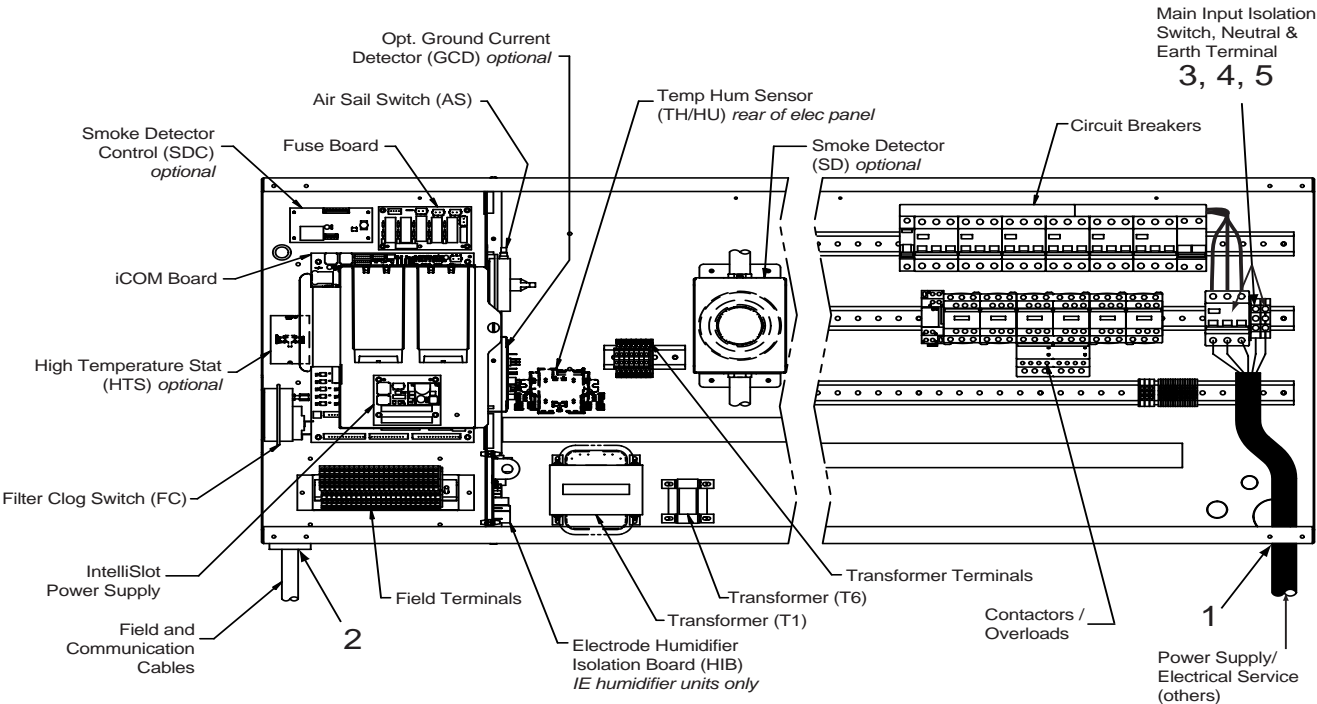


CAUTION

Risk of overheated terminals. Can cause wiring and component damage.

Use copper wiring only. Make sure that all connections are tight.

Figure 30 Electrical panel general arrangement



Refer to 6.1 - Electrical Field Connection Descriptions
for keys to numbered items.

Figure 31 Field connection terminals



CAUTION

Field wiring to terminals 24VAC MAXIMUM VOLTAGE CONNECTION ONLY

6.1 Electrical Field Connection Descriptions

Standard Electrical Connections

1. **High voltage entrance**— 35mm (1-3/8") diameter hole and 44mm (1-3/4") knockout located in bottom of box.
2. **Low voltage entrance**— 51mm (2") diameter hole located in bottom of box.
3. **Three-phase electrical service**—Input isolator. Three-phase service not by Liebert.
4. **Earth ground**—Terminal for field-supplied earth grounding wire.
5. **Neutral**— Terminal for field-supplied neutral wire.
6. **Remote unit shutdown**—Replace existing jumper between terminals 37 and 38 with field-supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field-supplied Class 1 wiring.
7. **Customer alarm inputs**—Terminals for field-supplied, normally open contacts, having a minimum 75VA, 24VAC rating, between terminals 24 and 50, 51, 55, 56. Use field-supplied Class 1 wiring. Terminal availability varies by unit options.
8. **SiteScan**—Terminals 77(-) and 78(+) for a two-wire, twisted pair, communication cable to optional SiteScan.
9. **Common alarm**—On any alarm, normally open dry contact is closed across terminals 75 and 76 for remote indication. 1A, 24VAC max load. Use Class 1 field-supplied wiring.
10. **Heat rejection interlock**—On a call for compressor operation, normally open dry contacts are closed across terminals 70 and 71 (compressor 1) and 70A and 71A (compressor 2) to heat rejection equipment. 1A, 24VAC max load. Use Class 1 field-supplied wiring.
11. **Water under floor sensor (LWD)**—Field connections for factory supplied sensor and lead. Up to 5 sensors can be connected in series up to a maximum of 20m (65ft).

Optional Electrical Connections

12. **Smoke sensor alarm**—Factory wired dry contacts from smoke sensor are 91-common, 92-NO and 93-NC. Supervised contacts, 80 and 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1A, 24VAC max load. Use Class 1 field-supplied wiring.
13. **Reheat and humidifier lockout**—Remote 24VAC required at terminals 82 and 83 for lockout of reheat and humidifier.
14. **Condensate alarm (with condensate pump option)**—On pump high water indication, normally open, dry contact is closed across terminals 88 and 89 for remote indication. 1A, 24VAC max load. Use Class 1 field-supplied wiring.
15. **Analog inputs**—Terminals for up to two factory optional analog inputs. Device 1 wires to 41(-) and 42(+). Device 2 wires to 43(-) and 44(+).

Optional Low Voltage Terminal Package Connections

16. **Remote unit shutdown** - Two additional contact pairs available for unit shutdown (labeled as 37B and 38B, 37C and 38C). Replace jumpers with field-supplied, normally closed switch having a minimum 75VA, 24VAC rating. Use Class 1 field-supplied wiring.
17. **Common alarm**—On any alarm, two additional normally open dry contacts are closed across terminals 94 and 95 and 96 and 97 for remote indication. 3A, 24VAC max load. Use Class 1 field-supplied wiring.
18. **Main fan auxiliary switch**—On closure of main fan contactor, normally open dry contact is closed across terminals 84 and 85 for remote indication. 1A, 24VAC max load. Use Class 1 field-supplied wiring.
19. **Liqui-tect shutdown and dry contact**—On Liqui-tect activation all fans shutdown and a normally open dry contact is closed across terminals 58 and 59 for remote indication. Liqui-tect sensor ordered separately. 1A, 24VAC max load. Use Class 1 field-supplied wiring. Cannot be used in conjunction with LWD factory supplied water under floor sensor.



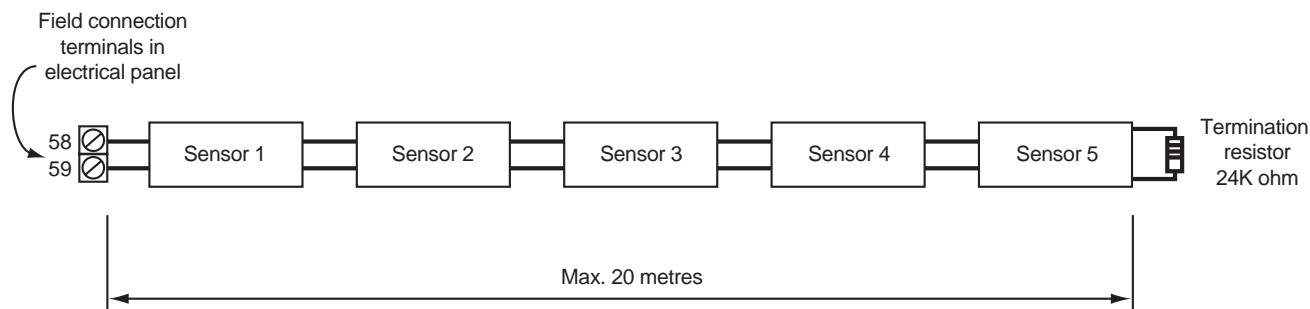
NOTE

Refer to specification sheet for total unit full load amps, wire size amps and maximum overcurrent protective device size.

6.1.1 Water Under Floor Sensor (LWD)

Each Liebert PEX unit is shipped from the factory with a water under floor sensor, 3.7m (12ft) lead and termination resistor for field connection. A maximum of 5 sensors may be connected in series. Regardless of the quantity, a single termination resistor (value=24K ohm) must be fitted at the furthest end of the line.

Figure 32 Water Under Floor Sensor (LWD) wiring



6.1.2 Remote Air Cooled Condenser Power Kit Option

Air cooled Liebert PEX units can be supplied with an optional factory fitted power kit for remote electrical service to the outdoor air cooled condenser. A 16amp rated single pole circuit breaker and contactor is provided for each refrigeration circuit.



CAUTION

Do not exceed the electrical rating for this circuit. Consult the factory should this service be insufficient for condenser power requirements. Unit FLA includes 16amp allowance when ordered as a factory option.

6.1.3 iCOM Network Cabling

Up to 2 off CAT5e cables may be required to connect each PEX iCOM unit to an external network switch. These should be routed up the left hand side of the unit along with other low voltage field and communication cables. Keep away from any power cables. Refer to **Figure 30 - Electrical panel general arrangement**.

Refer to 051536 iCOM User manual for PEX Applications for details on networking cable requirements.

6.1.4 IntelliSlot 485 and WEB/SNMP Cards

These optional cards require twisted pair shielded communication and CAT5e cables which should be routed up the left hand side of the unit along with other low voltage field and communication cables. Keep away from power cables. Refer to **Figure 30 - Electrical panel general arrangement**.

Refer to the IntelliSlot 485 and WEB/SNMP card technical documents for further information.

7.0 PIPING

All fluid and refrigeration connections to the unit, with the exception of the humidifier supply and condensate drain, are sweat copper. Factory-installed piping brackets must not be removed. Field-installed piping must be installed in accordance with local codes and must be properly assembled, supported, isolated and insulated. Avoid piping runs through noise-sensitive areas, such as office walls and conference rooms.

Refer to specific text and detailed diagrams in this manual for other unit-specific piping requirements.

All piping below the elevated floor must be located so that it offers the least resistance to air flow. Careful planning of the piping layout under the raised floor is required to prevent the air flow from being blocked. When installing piping on the subfloor, it is recommended that the pipes be mounted in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel to the air flow.

7.1 Fluid Connections



CAUTION

Risk of leaking water. Can cause equipment and building damage.

This unit requires a water drain connection and an external water supply to operate.

Improper installation, application and service practice can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

Emerson recommends installing leak detection equipment for unit and supply lines.

7.1.1 Condensate Piping—Field-Installed

- Do not reduce drain lines
- Do not expose drain line to freezing temperatures
- Drain line may contain boiling water. Use copper or other suitable material
- Drain line must comply with local building codes
- Emerson recommends installing under-floor leak detection equipment

Gravity Drain - Infrared Humidifier units

- 3/4" BSPM drain connection is provided on units **without** optional factory-installed condensate pump
- Pitch drain line toward drain a minimum of 10mm per metre (1/8" per 1 foot) of length
- Drain is trapped internally. DO NOT trap external to equipment
- Drain line must be sized for 7.6 l/m (2 gpm) flow and suitable for boiling water

Gravity Drain - Immersed Electrode Humidifier units

- 25mm (1") O.D. drain connection is provided. The install pack includes a length of hose to extend through the unit base
- Pitch drain line toward drain a minimum of 10mm per metre (1/8" per 1 foot) of length
- Drain **MUST BE** trapped externally
- Drain line must be sized for 7.6 l/m (2 gpm) flow and suitable for boiling water

Condensate Pump

- 1/2" copper sweat connection is provided on units **with** optional condensate pump (NB: factory installed in Infrared humidifier units. Loose supplied for external installation in Immersed Electrode humidifier units)
- Condensate pump (50Hz) is rated for approx. 1625 l/h at 3.2m (430 gph at 10 feet) total head
- Size piping based on available condensate head

7.1.2 Humidifier Supply Water

Infrared Humidifier

- 1/2" BSPM supply connection; maximum water pressure is 1034kPa (150 psi)
- Size humidifier supply line for 3.8 l/m (1 gpm), with a minimum water pressure of 140kPa (20 psi)
- Do not supply de-ionized water to the humidifier

Immersed Electrode Humidifier

- 1/2" BSPF supply connection; maximum water pressure is 700kPa (100psi)
- Size humidifier supply line for 3.8 l/m (1 gpm), with a minimum water pressure of 140kPa (20 psi)
- Do not supply de-ionized water to the humidifier

7.1.3 Requirements of Systems Using Water or Glycol

These guidelines apply to the field leak checking and fluid requirements for field piping systems, including Liebert chilled water, condenser (water or glycol) and drycooler circuits. General Guidelines

- Equipment damage and personal injury can result from improper piping installation, leak checking, fluid chemistry and fluid maintenance.
- Follow local piping codes and safety codes.
- Qualified personnel must install and inspect system piping.
- Contact a local water consultant regarding water quality, corrosion protection and freeze protection requirements.
- Install manual shutoff valves at the supply and return line to each indoor unit and drycooler to permit routine service and emergency isolation of the unit.



CAUTION

Risk of frozen fluids. Can cause equipment damage and building damage.

Freezing system fluids can rupture piping. Complete system drain-down cannot be ensured. When the field piping or unit may be exposed to freezing temperatures, charge the system with the proper percentage of glycol and water for the coldest design ambient.

Automotive antifreeze is unacceptable and must NOT be used in any glycol fluid system.



CAUTION

Risk of corrosion. Can cause equipment damage.

Read and follow individual unit installation instructions for precautions regarding fluid system design, material selection and use of field-provided devices. Liebert systems contain stainless steel and copper alloys that require appropriate corrosion protection.

Contact a local water consultant regarding water quality, corrosion and freeze protection requirements.

Water chemistry varies greatly by location, as do the required additives, called inhibitors, that reduce the corrosive effect of the fluids on the piping systems and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation.

Preferably, surface waters that are classified as soft and are low in chloride and sulfate ion content should be employed. Proper inhibitor maintenance must be performed in order to prevent corrosion of the system. Consult glycol manufacturer for testing and maintenance of inhibitors.

Commercial ethylene glycol (Union Carbide Ucartherm, Dow Chemical Dowtherm SR-1 and Texaco E.G. Heat Transfer Fluid 100), when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.



CAUTION

Risk of oxide layer formation. Can cause equipment damage.

Idle fluid allows the collection of sediment that prevents the formation of a protective oxide layer on the inside of tubes. Keep unit switched ON and system pump operating.

.

Leak Checking of Unit and Field Piping

Liebert PEX unit fluid systems are factory-checked for leaks and may be shipped with a nitrogen holding charge. Liebert unit fluid circuits should be checked for leaks at installation as described below.



NOTE

During leak checking of field-installed piping, Liebert recommends that the unit be isolated using field-installed shutoff valves. When the Liebert units are included in a leak test, use of fluid for pressure testing is recommended. When pressurized gas is used for leak testing the Liebert unit, the maximum recommended pressure is 2 bar (30 psig) and tightness of the unit should be verified by pressure decay over time, (<2 psig/hour [0.3 bars/hour]) or sensing a tracer gas with suitable instrumentation. Dry seals in fluid valves and pumps may not hold a high gas pressure.

7.2 Refrigeration Piping



WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause injury or death.

This unit contains fluids and/or gases under high pressure.

Relieve pressure before working with piping. Recover refrigerant as per local codes.

Both high pressure (HP) and low pressure (LP) switches do NOT have a schrader valve core fitted. Lower system pressures to atmosphere BEFORE removing either switch.



CAUTION

Risk of oil contamination with water. Can cause equipment damage.

All Liebert PEX Systems require the use of POE (polyolester) oil. See **11.9.1 - Compressor Oil** for requirements. POE oil absorbs water at a much faster rate when exposed to air than previously used oils. Because water is the enemy of a reliable refrigeration system, extreme care must be used when opening systems during installation or service. If water is absorbed into the POE oil, it will not be easily removed and will not be removed through the normal evacuation process. If the oil is too wet, it may require an oil change. POE oils also have a property that makes them act as a solvent in a refrigeration system. Maintaining system cleanliness is extremely important because the oil will tend to bring any foreign matter back to the compressor.



NOTE

The Liebert PEX indoor cooling unit has a factory-installed high pressure safety switch in the high side refrigerant circuit.

7.2.1 Piping Guidelines—Air-Cooled Units

- Indoor unit ships with a nitrogen holding charge; do not vent the evaporator until all refrigerant piping is in place, ready for connection to the unit and condenser
- Ensure unit field connection isolation valves are wrapped when brazing
- Use copper piping with high temperature brazed joints
- Isolate piping from building using vibration-isolating supports
- Refer to **Table 13** for piping sizes
- Refer to condenser installation manual for charging information
- Install traps on hot gas (discharge) lines at the base of vertical risers and every 7.5m (25 feet) of vertical rise.
- Consult factory if condenser is installed more than 5m (16 feet) below the evaporator
- Consult factory if piping run exceeds 60m (200 feet) equivalent length
- Keep piping clean and dry
- Avoid piping runs through noise-sensitive areas
- Do not run piping directly in front of airstream
- Refrigerant oil – do not mix oil types (see **11.9.1 - Compressor Oil**)

Refer to ASHRAE Refrigeration Handbook for general good-practice refrigeration piping.

Table 13 Recommended refrigerant line sizes - OD copper mm (inches)

Model	1020		1025		1030		1035		2045		2055	
Equiv. Length	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid
15m (50ft)	22	13	22	16	28	16	28	16	28	16	28	16
30m (100ft)	22	16	22	16	28	16	28	19	28	22	28	22
45m (150ft)	22	16	28	16	28	22	28	22	35	22	35	22
60m (200ft)	28	16	28	19	28	22	28	22	35	22	35	22

Model	2040		2050		2060		2070	
Equiv. Length	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid
15m (50ft)	22	13	22	16	22	16	22	16
30m (100ft)	22	16	22	16	22	16	22	19
45m (150ft)	22	16	28	16	28	19	28	22
60m (200ft)	28	16	28	19	28	22	28	22

Model	3080		3090		3100	
Equiv. Length	Gas	Liquid	Gas	Liquid	Gas	Liquid
15m (50ft)	28	16	28	16	28	16
30m (100ft)	28	22	28	22	28	22
45m (150ft)	28	22	35	22	35	22
60m (200ft)	35	22	35	22	35	22

Metric/Imperial Equivalents						
mm	13	16	19	22	28	35
in.	1/2	5/8	3/4	7/8	1-1/8	1-3/8

Table 14 Indoor unit approximate refrigerant charge for R-22 or R-407C

System Type	Model	Refrigerant Charge per Circuit, kg (lb)
Air Cooled	1020, 1025, 1030	2.3 (5.1)
	1035	3.1 (6.8)
	2045, 2055	4.9 (10.8)
	2040, 2050, 2060	2.4 (5.3)
	2070	3.2 (7.0)
	3080, 3090	3.7 (8.1)
	3100	5.0 (11.0)
Water Cooled	1020	2.5 (5.5)
	1025, 1030, 1035	2.75 (6.1)
	2045, 2055	4.0 (8.8)
	2040	2.5 (5.5)
	2050, 2060	2.75 (6.1)
	2070	4 (8.8)
	3080, 3090, 3100	4 (8.8)

Table 15 Liquid Line charges - refrigerant per 30m (100 ft) of Type "L" copper tube

O.D.	Liquid Line, kg (lb)
1/2"	3.3 (7.3)
5/8"	5.3 (11.7)
3/4"	7.8 (17.2)
7/8"	11.1 (24.4)
1-1/8"	18.9 (41.6)

Table 16 Outdoor condenser approximate refrigerant charge kg (lb) per circuit

Model	Charge kg (lb)
LS20	1.1 (2.4)
LS25	1.9 (4.2)
LS40	1.9 (4.2)
LS50	2.9 (6.4)
LS60	2.8 (6.2)
LS70	4.2 (9.2)
LS80	4.0 (8.8)
LS100	6.0 (13.2)

System Charge

Refer to **Tables 14, 15** and **16** to estimate the total refrigerant charge required per circuit.

TOTAL CHARGE (per circuit) = indoor unit + liquid line + outdoor condenser

Additional Oil Requirements (Air Cooled Units only)

Whenever the TOTAL CHARGE per circuit exceeds the Base Charge Limit as listed in **Table 17**, additional oil (refer **11.9.1 - Compressor Oil**) must be added to the system according to the following:

Oil add (ml) = [Total Charge - Base Charge Limit] (kg) x 25

Oil add (oz.) = [Total Charge - Base Charge Limit] (lb.) x 0.35

The Base Charge Limit is defined as the total charge of refrigerant in the circuit that can be supported by the oil volume of the compressor before additional oil is required.

The amount of oil required within a circuit is more dependant on the refrigerant charge and compressor's oil pumping rate than the physical length of piping to be wetted.

Table 17 Base Charge Limit for Air Cooled Units

System Type	Model	Base Charge Limit per Circuit, kg (lb)
Air Cooled	1020, 1025	7.7 (17.0)
	1030, 1035	14.2 (31.2)
	2045, 2055	14.2 (31.2)
	2040, 2050	7.7 (17.0)
	2060, 2070	14.2 (31.2)
	3080, 3090, 3100	14.2 (31.2)

7.2.2 Piping Guidelines - Chilled Water units

- Units ship with a nitrogen holding charge; vent the circuits via the service/schrader access (bleed) valves on the cooling coil header pipes
- Use copper piping with high temperature brazed joints
- Insulate supply and return pipes/valves to prevent condensation
- Do not run piping directly in front of airstream
- Downflow EC Fan units - do not route piping or other services in 'no-go' regions - refer **Figure 22 - Minimum clearance requirements for EC Fan Installation**

7.3 Dehydration/Leak Test and Charging Procedures for R-407C and R-22

7.3.1 Air Cooled Condenser with Electronic Fan Speed Head Pressure Control System

The Fan Speed Control system uses a pressure activated electronic fan speed control system to ensure operation at ambient temperatures as low as -5°C (23°F). Refer to the Air Cooled Condenser technical data manual for further information.

Fan Speed Control Piping

A copper discharge line and liquid line must be field-installed between the indoor unit and the outdoor condenser for each refrigeration circuit. See **Figure 33** for details.

Electrical Interconnection

The remote air cooled condenser is factory wired and requires a single phase power supply (230-1-50) to operate. The power supply for the condenser can be provided either from the indoor PEX unit (via optional Remote Air Cooled Condenser Power Kit) or from a separate source. A 24VAC interlock connection is available from terminals 70-71 (70A-71A) in the PEX unit electrical panel. Refer **Figure 31 - Field connection terminals**

Fan Speed Control Leak Check and Evacuation Procedure

Proper leak check and evacuation can be accomplished only with all system solenoid and isolation valves open and check valves accounted for.

1. If unit power is available, open the unit liquid line solenoid valves using the evacuation function for Compressor #1 and Compressor #2 in the diagnostic section of the iCOM control (refer to the iCOM user manual, 051536). If unit power is not available, a field-supplied 24VAC / 75VA power source must be directly connected to each of the unit solenoid valves.
2. Connect refrigerant gauges to the suction and discharge line Schrader access valves on both compressors.
3. For each circuit, open the isolation valves and place a 150 PSIG (1034 kPa) dry nitrogen charge. Check system for leaks using an acceptable leak test method.



NOTE

The use of fluorocarbon substances as a trace gas for leak testing is not permitted in many countries. Check local refrigerant handling codes of practice before use.

4. After completion of leak testing, release the test pressure (per local code) and pull an initial deep vacuum on the system with a suitable pump.
5. After four hours, check the pressure readings and, if they have not changed, break vacuum with dry nitrogen. Pull a second (R-407C and R-22) and third (R407C only) vacuum to 250 microns or less. Recheck the pressure after two hours. After completing this step, proceed to **Fan Speed Charging**.

Fan Speed Charging

1. Check unit nameplate for refrigerant type to be used. Unit control configurations differ depending on refrigerant type.
2. Refrigerant charging requires unit operation. Refer to **9.0 - Checklist for Completed Installation**.
3. Calculate the amount of charge for the system. Refer to the unit, condenser and refrigerant line charge data in **Tables 14, 15 and 16**.
4. Weigh in as much of the system charge as possible before starting the unit.



CAUTION

Risk of improper refrigerant charging. Can cause equipment damage.

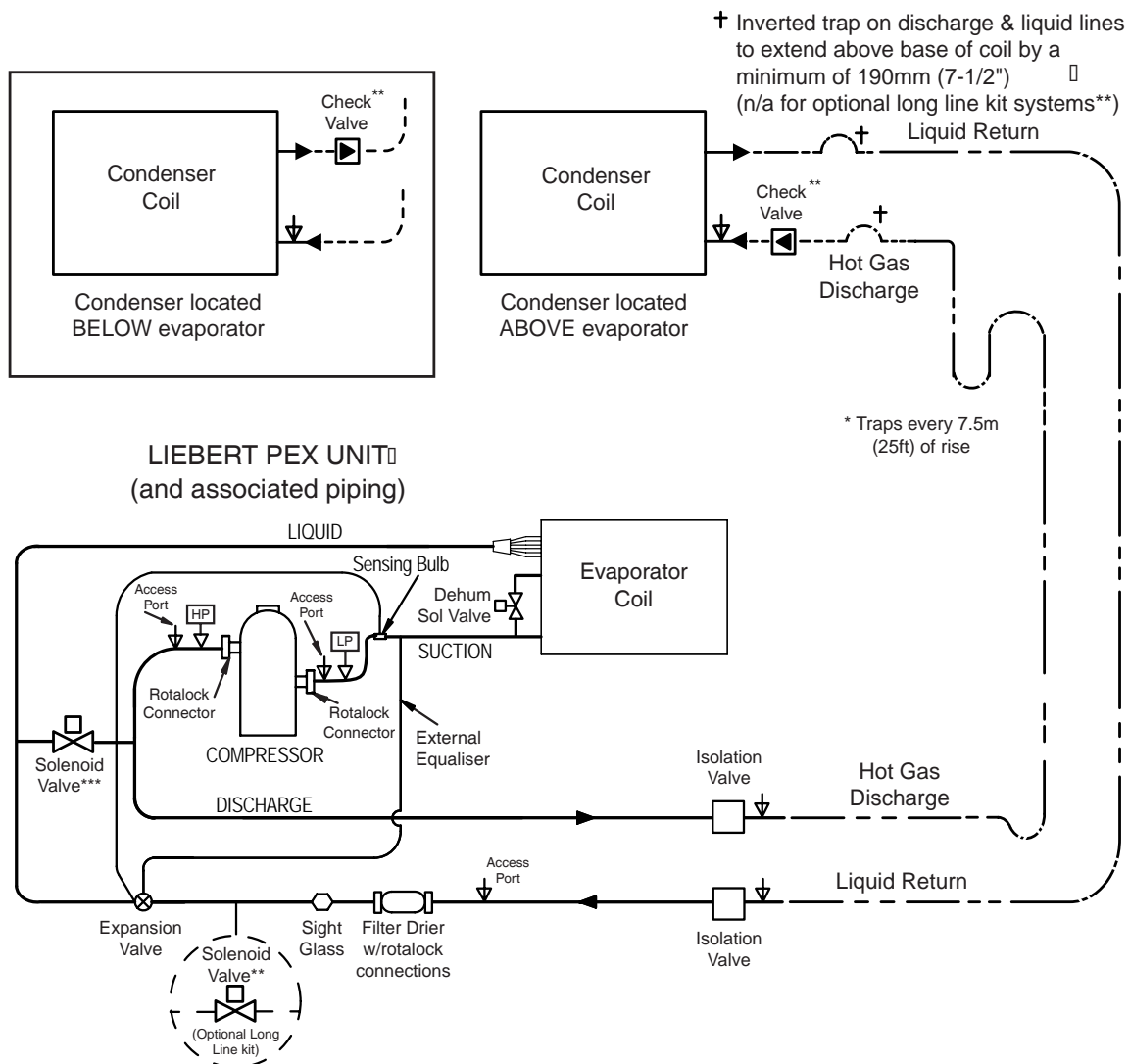
Refrigerant R407C is a blend of three components and must be introduced and charged from the cylinder only as a liquid.

When adding liquid refrigerant to an operating system, it may be necessary to add the refrigerant through the compressor suction line access valve. Care must be exercised to avoid damage to the compressor. Emerson recommends connecting a sight glass between the charging hose and the compressor suction line access valve. This will permit adjustment of the cylinder hand valve so that liquid can leave the cylinder while allowing vapor to enter the compressor.

5. Turn on unit isolation switch. Operate the unit for 30 minutes using the charging function for Compressor #1 and Compressor #2 in the diagnostic section of the iCOM control (see iCOM user manual, 051536). The charging function operates the compressor at full capacity and energizes the evaporator fan motor and the liquid line solenoid valve. The reheat and humidifier are disabled. A minimum 140kPa (20psig) must be established and maintained for the compressor to operate. The charging function can be reset as many times as required to complete unit charging.
6. Charge the unit until the liquid line sight glass becomes clear.
7. As head pressure builds, the fan speed controlled condenser fans begin rotating. The fan(s) will run at full speed when sufficient head pressure is developed—fans start to rotate at 1400 kPa (200 psig) and reach full speed at 1800 kPa (260 psig). On decreasing pressure, the fans will stop at 1350 kPa (195 psig).

8.0 PIPING SCHEMATICS

Figure 33 Piping schematic - air cooled, scroll compressor models



NOTE: SINGLE REFRIGERATION CIRCUIT SHOWN FOR CLARITY. DEHUM SOLENOID VALVE IN CIRCUIT 1 ONLY.

- FACTORY PIPING
- - - FIELD PIPING
- - - - - OPTIONAL FACTORY PIPING
- ▽ SERVICE / SCHRADER (ACCESS) CONNECTION NO VALVE CORE
- ▽ SERVICE / SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

* Components are not supplied by Emerson but are recommended for proper circuit operation and maintenance

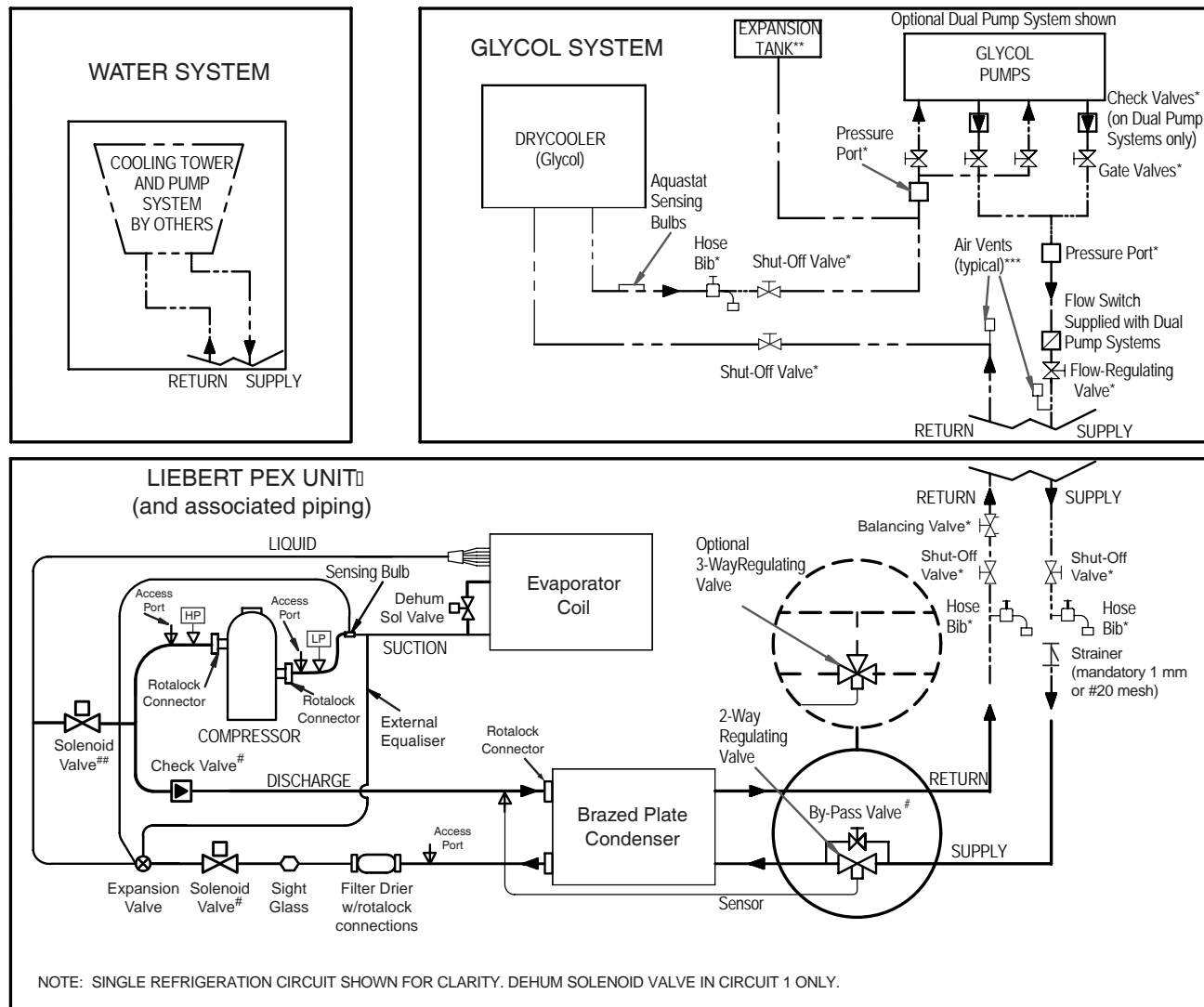
** Field installed check valves shipped loose with optional long line kit

*** Single compressor models only

NOTE: SCHEMATIC REPRESENTATION SHOWN. THIS SCHEMATIC DOES NOT IMPLY OR DEFINE ELEVATIONS AND COMPONENT LOCATION, UNLESS SPECIFICALLY NOTED.

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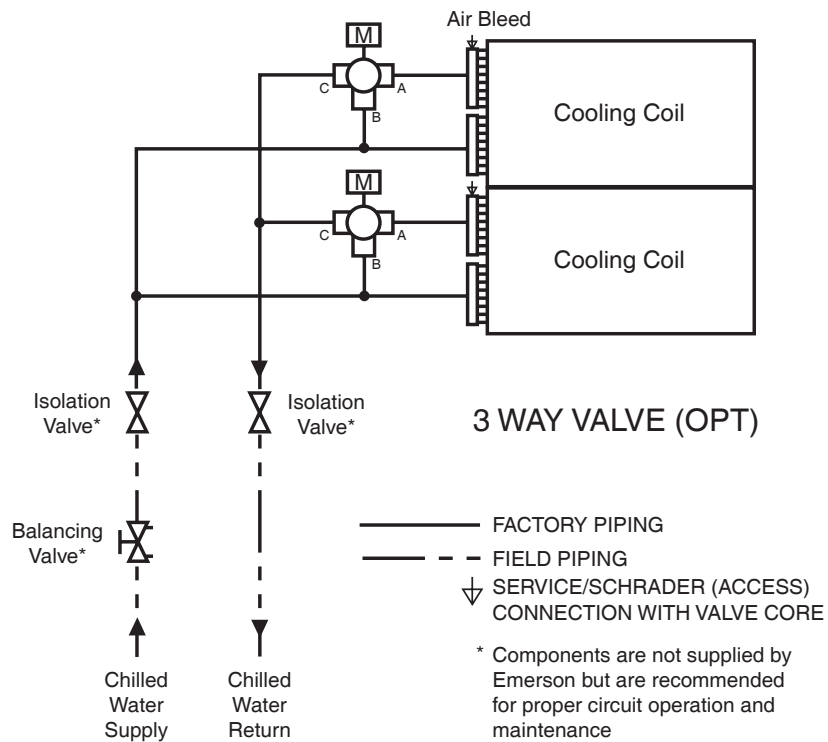
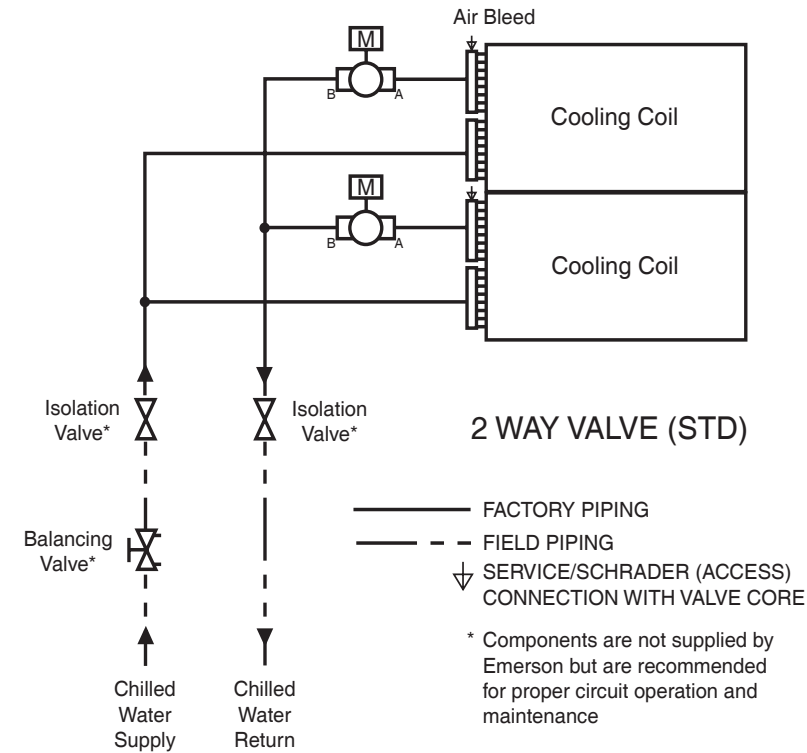
Figure 34 Piping schematic - water/glycol, scroll compressor models



NOTE: SCHEMATIC REPRESENTATION SHOWN. THIS SCHEMATIC DOES NOT IMPLY OR DEFINE ELEVATIONS AND COMPONENT LOCATION, UNLESS SPECIFICALLY NOTED.

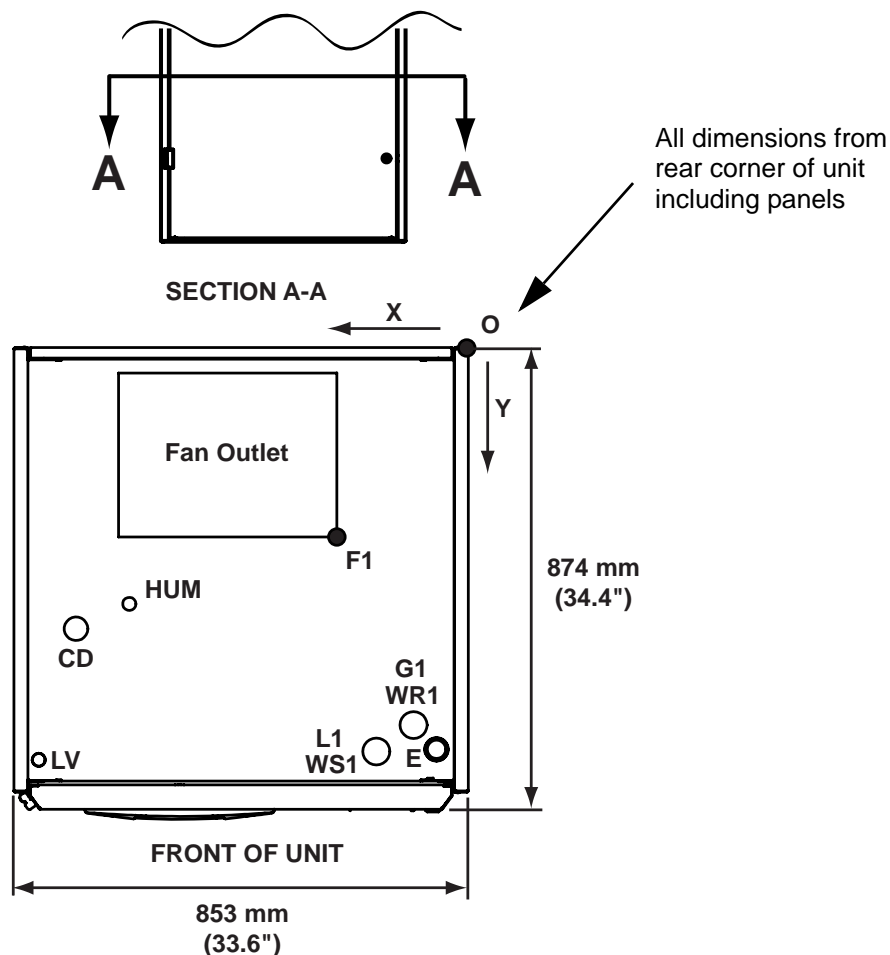
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Figure 35 Piping schematic - chilled water models



NOTE: SCHEMATIC REPRESENTATION SHOWN. THIS SCHEMATIC DOES NOT IMPLY OR DEFINE ELEVATIONS AND COMPONENT LOCATION, UNLESS SPECIFICALLY NOTED.

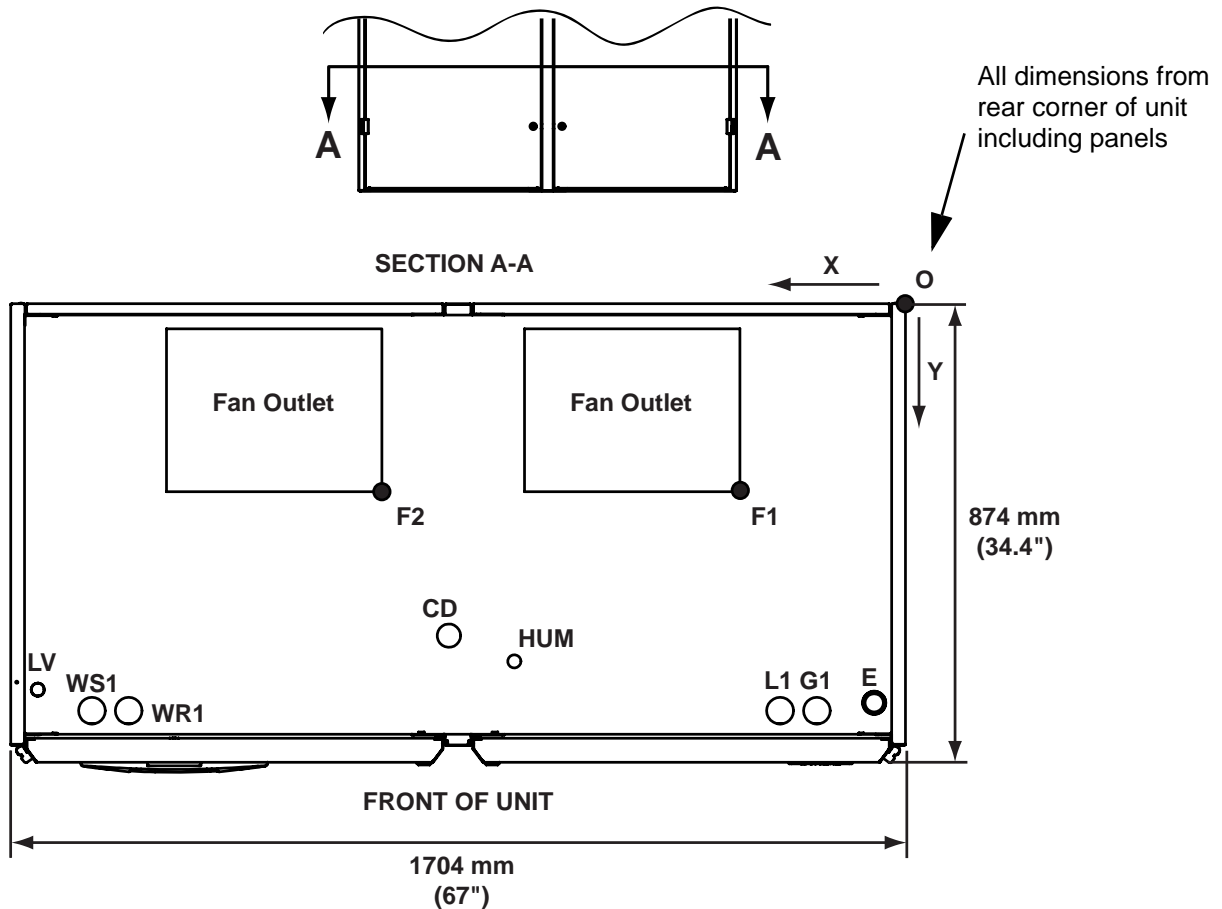
Figure 36 Primary connection locations - 1 bay downflow, air/water/glycol cooled, single scroll compressor, forward curve fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)	
				1020, 1025F	1030, 1035F
G1	Hot Gas Circuit 1	103 (4)	714 (28-1/8)	5/8" I.D.	7/8" I.D.
L1	Liquid Line Circuit 1	173 (6-3/4)	764 (30-1/8)	5/8" I.D.	
WS1	Water/Glycol Supply Circ 1	173 (6-3/4)	764 (30-1/8)	1-1/8" I.D.	1-3/8" I.D.
WR1	Water/Glycol Return Circ 1	103 (4)	714 (28-1/8)	1-1/4" O.D.	
CD-IR	Condensate Drain (Infrared)*	737 (29)	532 (21)	3/4" BSPM	
	w/Optional Pump	737 (29)	532 (21)	1/2" comp.	
HUM-IR	Humidifier water supply (Infrared)	637 (25)	485 (19-1/8)	1/2" BSP	
CD-IE	Condensate Drain (Elect)*	737 (29)	532 (21)	25mm OD (1")	
HUM-IE	Humidifier water supply (Elect)	637 (25)	485 (19-1/8)	1/2" BSP	
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.	
LV	Electrical Conn. (Low Volt)	807 (31-3/4)	780 (30-3/4)	25 (1)	
F1	Fan Outlet	247 (9-3/4)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)	

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 37 Primary connection locations - 2 bay downflow, air/water/glycol cooled, single scroll compressor, forward curve fan

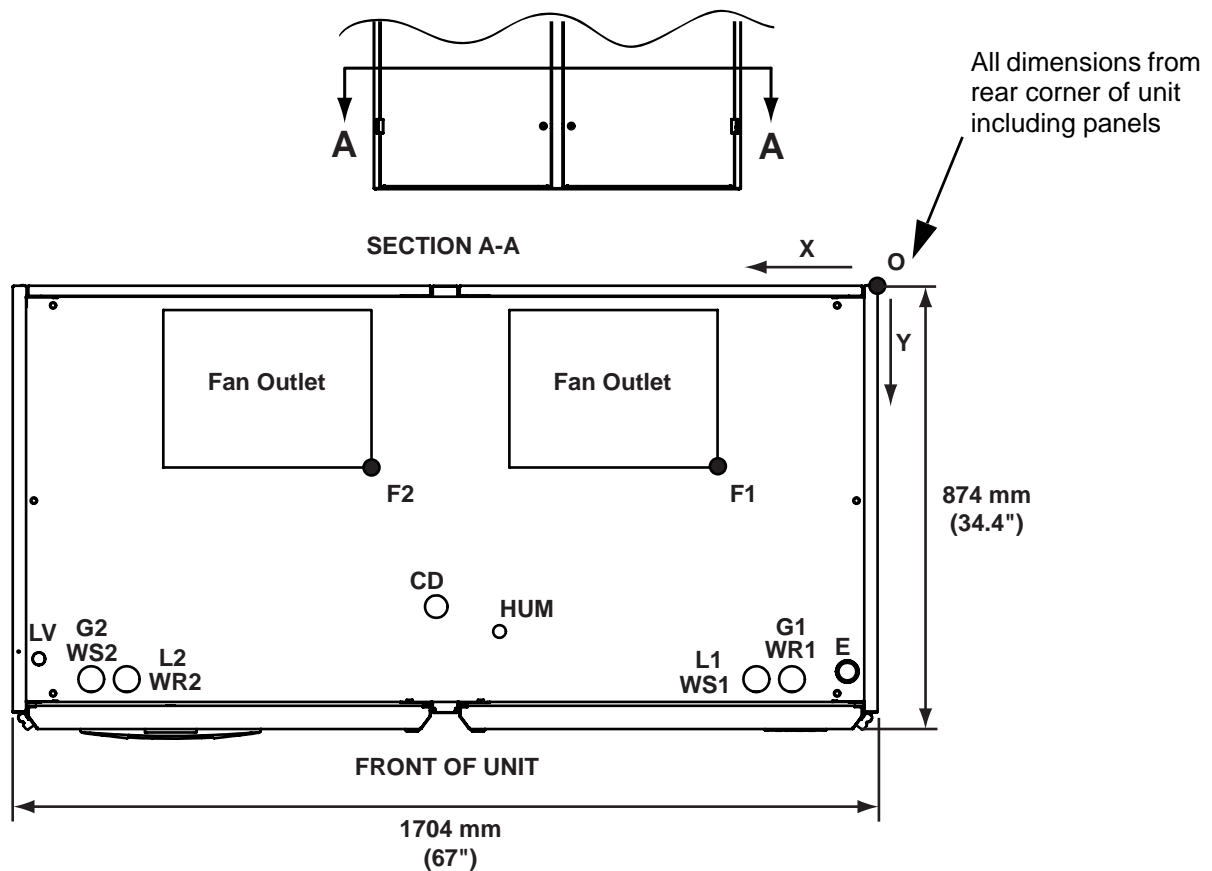


Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2045, 2055F**
G1	Hot Gas Circuit 1	169 (6-5/8)	775 (30-1/2)	7/8" I.D.
L1	Liquid Line Circuit 1	239 (9-3/8)	775 (30-1/2)	5/8" I.D.
WS1	Water/Glycol Supply Circ 1	1549 (61)	775 (30-1/2)	1-1/4" I.D.
WR1	Water/Glycol Return Circ 1	1479 (58-1/4)	775 (30-1/2)	1-1/4" O.D.
CD-IR	Condensate Drain (Infrared)*	869 (34-1/4)	632 (25)	3/4" BSPM
	w/Optional Pump	869 (34-1/4)	632 (25)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	745 (29-1/4)	681 (26-3/4)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	869 (34-1/4)	632 (25)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	745 (29-1/4)	681 (26-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1652 (65)	735 (28-7/8)	25 (1)
F1	Fan Outlet	315 (12-3/8)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)
F2	Fan Outlet	997 (39-1/4)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

** Water circuit includes regulating valve and bypass valve

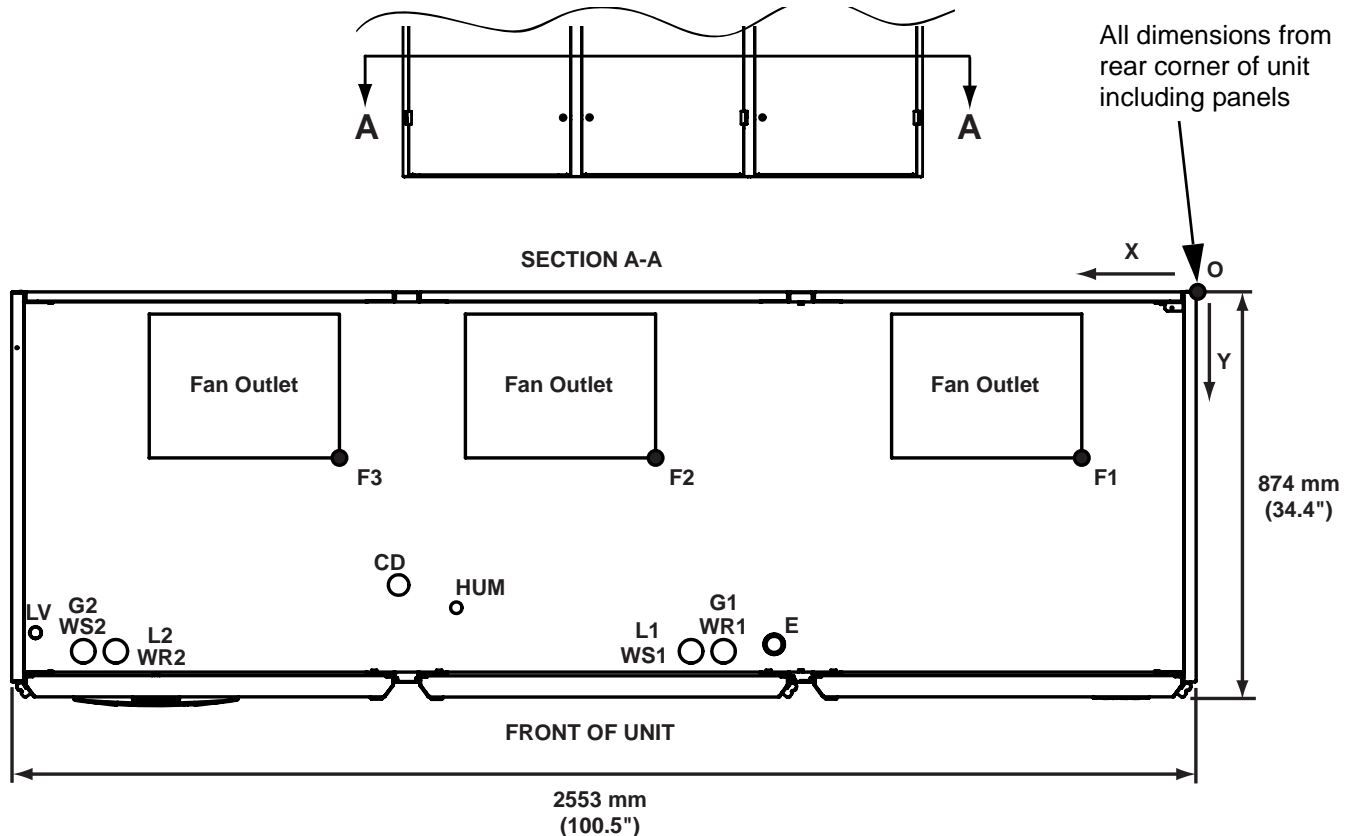
Figure 38 Primary connection locations - 2 bay downflow air/water/glycol cooled, dual scroll compressor models, forward curve fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)		
				2040F	2050F	2060, 2070F
G1	Hot Gas Circuit 1	169 (6-5/8)	775 (30-1/2)	5/8" I.D.	7/8" I.D.	
G2	Hot Gas Circuit 2	1549 (61)	775 (30-1/2)	5/8" I.D.	7/8" I.D.	
L1	Liquid Line Circuit 1	239 (9-3/8)	775 (30-1/2)	5/8" I.D.		
L2	Liquid Line Circuit 2	1479 (58-1/4)	775 (30-1/2)	5/8" I.D.		
WS1	Water/Glycol Supply Circ 1	239 (9-3/8)	775 (30-1/2)	1-1/8" I.D.		1-3/8" I.D.
WS2	Water/Glycol Supply Circ 2	1549 (61)	775 (30-1/2)	1-1/8" I.D.		1-3/8" I.D.
WR1	Water/Glycol Return Circ 1	169 (6-5/8)	775 (30-1/2)	1-1/4" O.D.		
WR2	Water/Glycol Return Circ 2	1479 (58-1/4)	775 (30-1/2)	1-1/4" O.D.		
CD-IR	Condensate Drain (Infrared)*	869 (34-1/4)	632 (24-7/8)	3/4" BSPM		
	w/Optional Pump	869 (34-1/4)	632 (24-7/8)	3/8" comp.		
HUM-IR	Humidifier water supply (Infrared)	745 (29-3/8)	681 (26-3/4)	1/2" BSP		
CD-IE	Condensate Drain (Elect)*	869 (34-1/4)	632 (24-7/8)	25mm OD (1")		
HUM-IE	Humidifier water supply (Elect)	745 (29-3/8)	681 (26-3/4)	1/2" BSP		
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.		
LV	Electrical Conn. (Low Volt)	1652 (65)	735 (28-7/8)	25 (1)		
F1	Fan Outlet	315 (12-3/8)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)		
F2	Fan Outlet	997 (39-1/4)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)		

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 39 Primary connection locations - 3 bay downflow, air/water/glycol cooled, dual scroll compressor, forward curve fan

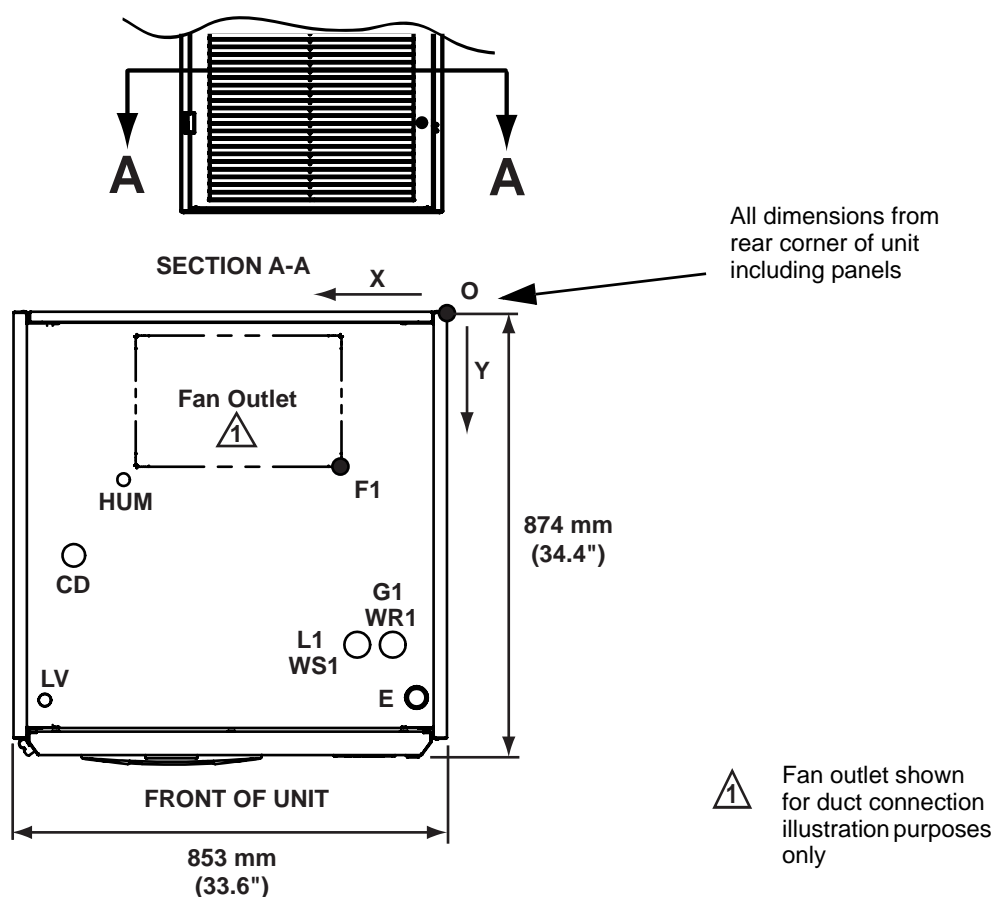


Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)	
				3080F	3090, 3100F**
G1	Hot Gas Circuit 1	1019 (40-1/8)	775 (30-1/2)	7/8" I.D.	
G2	Hot Gas Circuit 2	2399 (94-1/2)	775 (30-1/2)	7/8" I.D.	
L1	Liquid Line Circuit 1	1089 (42-7/8)	775 (30-1/2)	5/8" I.D.	
L2	Liquid Line Circuit 2	2329 (91-3/4)	775 (30-1/2)	5/8" I.D.	
WS1	Water/Glycol Supply Circ 1	1089 (42-7/8)	775 (30-1/2)	1-3/8" I.D.	1-1/4" I.D.
WS2	Water/Glycol Supply Circ 2	2399 (94-1/2)	775 (30-1/2)	1-3/8" I.D.	1-1/4" I.D.
WR1	Water/Glycol Return Circ 1	1019 (40-1/8)	775 (30-1/2)	1-1/4" O.D.	
WR2	Water/Glycol Return Circ 2	2329 (91-3/4)	775 (30-1/2)	1-1/4" O.D.	
CD-IR	Condensate Drain (Infrared)*	1719 (67-5/8)	632 (24-7/8)	3/4" BSPM	
	w/Optional Pump	1719 (67-5/8)	632 (24-7/8)	3/8" comp.	
HUM-IR	Humidifier water supply (Infrared)	1595 (62-3/4)	681 (26-3/4)	1/2" BSP	
CD-IE	Condensate Drain (Elect)*	1719 (67-5/8)	632 (24-7/8)	25mmOD (1")	
HUM-IE	Humidifier water supply (Elect)	1595 (62-3/4)	681 (26-3/4)	1/2" BSP	
E	Electrical Conn. (High Volt)	910 (35-7/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.	
LV	Electrical Conn. (Low Volt)	2502 (98-1/2)	735 (28-7/8)	25 (1)	
F1	Fan Outlet	247 (9-3/4)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)	
F2	Fan Outlet	1165 (45-7/8)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)	
F3	Fan Outlet	1847 (72-3/4)	358 (14-1/8)	410 x 310 (16-1/8 x 12-1/4)	

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

** Water circuit includes regulating valve and bypass valve

Figure 40 Primary connection locations - 1 bay upflow, air/water/glycol cooled, single scroll compressor models, forward curve fan

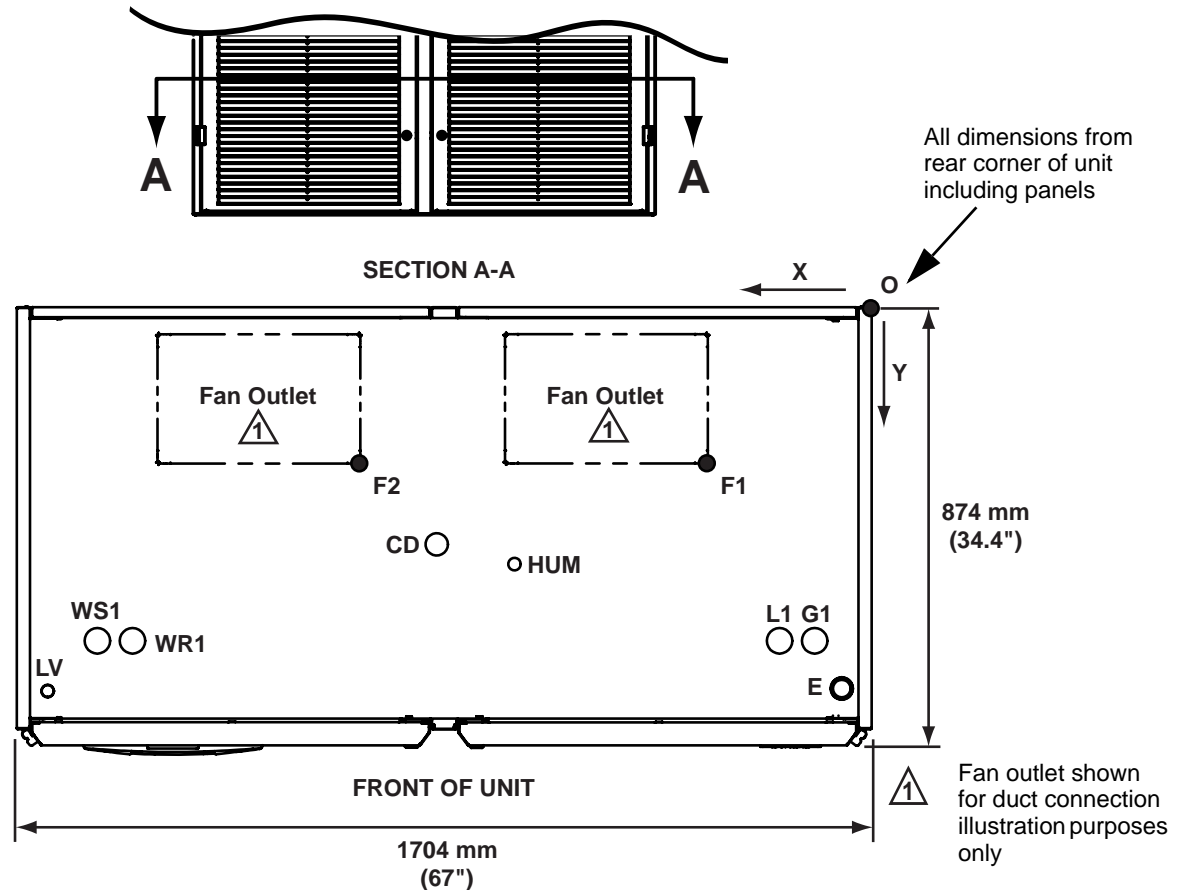


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)	
				1020, 1025U	1030, 1035U
G1	Hot Gas Circuit 1	107 (4-1/4)	656 (25-7/8)	5/8" I.D.	7/8" I.D.
L1	Liquid Line Circuit 1	177 (7)	656 (25-7/8)	5/8" I.D.	
WS1	Water/Glycol Supply Circ 1	177 (7)	656 (25-7/8)	1-1/8" I.D.	1-3/8" I.D.
WR1	Water/Glycol Return Circ 1	107 (4-1/4)	656 (25-7/8)	1-1/4" O.D.	
CD-IR	Condensate Drain (Infrared)*	735 (28-7/8)	480 (18-7/8)	3/4" BSPM	
	w/Optional Pump	735 (28-7/8)	480 (18-7/8)	3/8" comp.	
HUM-IR	Humidifier water supply (Infrared)	637 (25-1/8)	331 (13)	1/2" BSP	
CD-IE	Condensate Drain (Elect)*	735 (28-7/8)	480 (18-7/8)	25mm OD (1")	
HUM-IE	Humidifier water supply (Elect)	637 (25-1/8)	331 (13)	1/2" BSP	
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.	
LV	Electrical Conn. (Low Volt)	792 (31-1/8)	765 (30-1/8)	25 (1)	
F1	Fan Outlet	185 (7-1/4)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)	

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 41 Primary connection locations - 2 bay upflow, air/water/glycol cooled, single scroll compressor models, forward curve fan



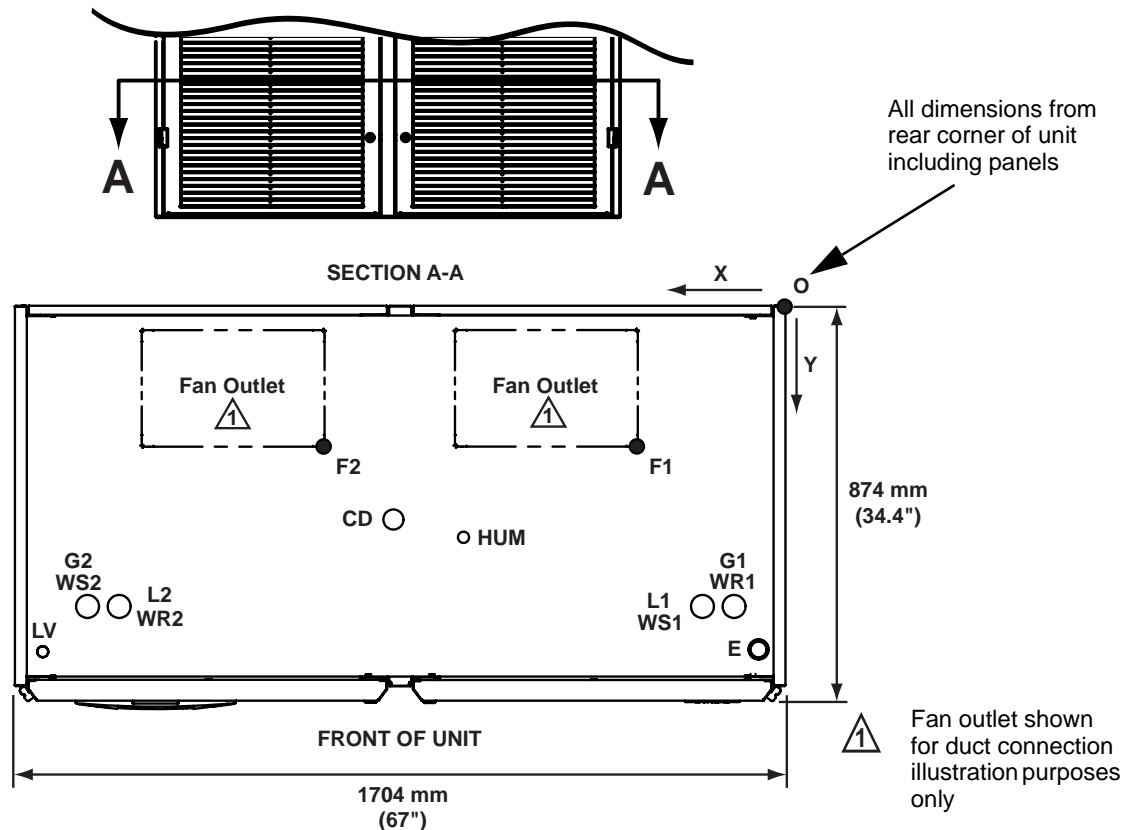
Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2045, 2055U**
G1	Hot Gas Circuit 1	114 (4-1/2)	665 (26-1/8)	7/8" I.D.
L1	Liquid Line Circuit 1	184 (7-1/4)	665 (26-1/8)	5/8" I.D.
WS1	Water/Glycol Supply Circ 1	1543 (60-3/4)	665 (26-1/8)	1-1/4" I.D.
WR1	Water/Glycol Return Circ 1	1473 (58)	665 (26-1/8)	1-1/4" O.D.
CD-IR	Condensate Drain (Infrared)*	867 (34-1/8)	473 (18-5/8)	3/4" BSPM
	w/Optional Pump	867 (34-1/8)	473 (18-5/8)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	712 (28)	512 (20-1/8)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	867 (34-1/8)	473 (18-5/8)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	712 (28)	512 (20-1/8)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1642 (64-5/8)	765 (30-1/8)	25 (1)
F1	Fan Outlet	235 (9-1/4)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)
F2	Fan Outlet	1065 (41-7/8)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

** Water circuit includes regulating valve and bypass valve

Figure 42 Primary connection locations - 2 bay upflow, air/water/glycol cooled, dual scroll compressor models, forward curve fan

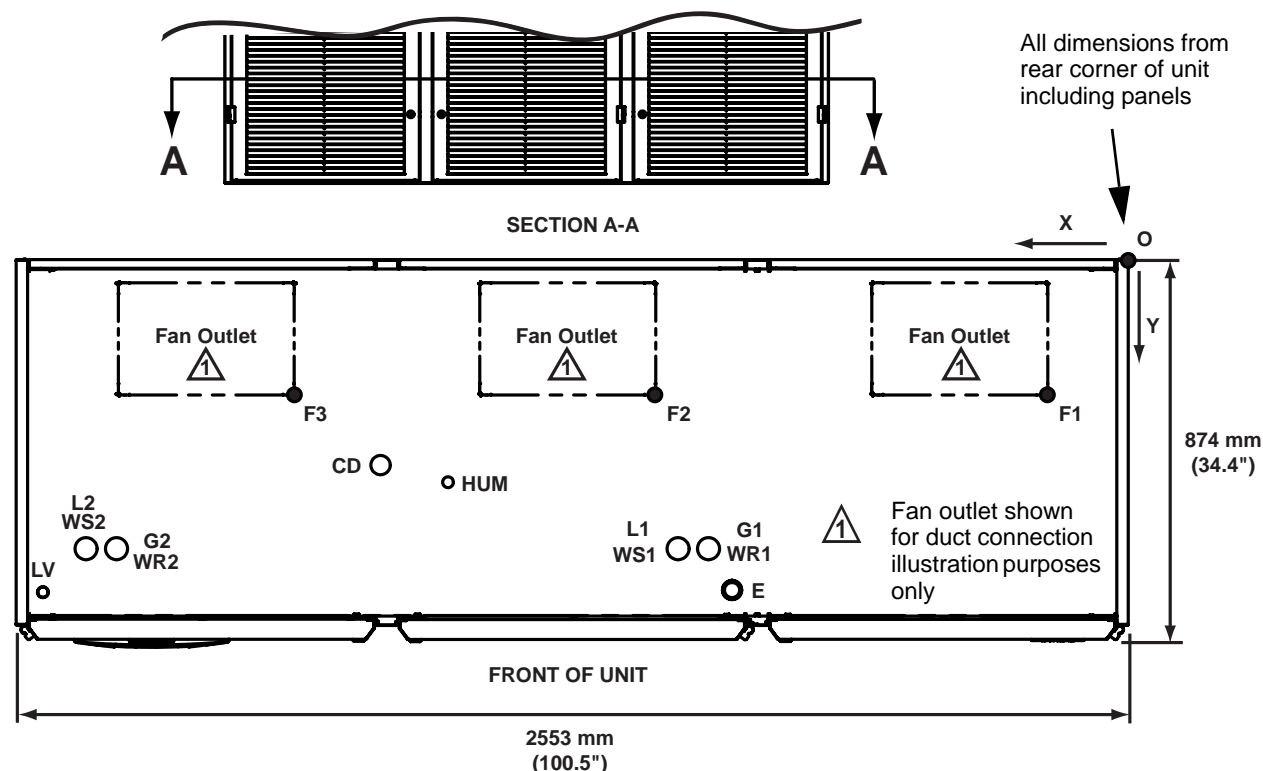


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)		
				2040U	2050U	2060, 2070U
G1	Hot Gas Circuit 1	114 (4-1/2)	665 (26-1/8)	5/8" I.D.	7/8" I.D.	
G2	Hot Gas Circuit 2	1543 (60-3/4)	665 (26-1/8)	5/8" I.D.	7/8" I.D.	
L1	Liquid Line Circuit 1	184 (7-1/4)	665 (26-1/8)	5/8" I.D.		
L2	Liquid Line Circuit 2	1473 (58)	665 (26-1/8)	5/8" I.D.		
WS1	Water/Glycol Supply Circ 1	184 (7-1/4)	665 (26-1/8)	1-1/8" I.D.		1-3/8" I.D.
WS2	Water/Glycol Supply Circ 2	1543 (60-3/4)	665 (26-1/8)	1-1/8" I.D.		1-3/8" I.D.
WR1	Water/Glycol Return Circ 1	114 (4-1/2)	665 (26-1/8)	1-1/4" O.D.		
WR2	Water/Glycol Return Circ 2	1473 (58)	665 (26-1/8)	1-1/4" O.D.		
CD-IR	Condensate Drain (Infrared)*	867 (34-1/8)	473 (18-5/8)	3/4" BSPM		
	w/Optional Pump	867 (34-1/8)	473 (18-5/8)	3/8" comp.		
HUM-IR	Humidifier water supply (Infrared)	712 (28)	512 (20-1/8)	1/2" BSP		
CD-IE	Condensate Drain (Elect)*	867 (34-1/8)	473 (18-5/8)	25mm OD (1")		
HUM-IE	Humidifier water supply (Elect)	712 (28)	512 (20-1/8)	1/2" BSP		
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.		
LV	Electrical Conn. (Low Volt)	1642 (64-5/8)	765 (30-1/8)	25 (1)		
F1	Fan Outlet	235 (9-1/4)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)		
F2	Fan Outlet	1065 (41-7/8)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)		

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 43 Primary connection locations - 3 bay upflow, air/water/glycol cooled, dual scroll compressor models, forward curve fan



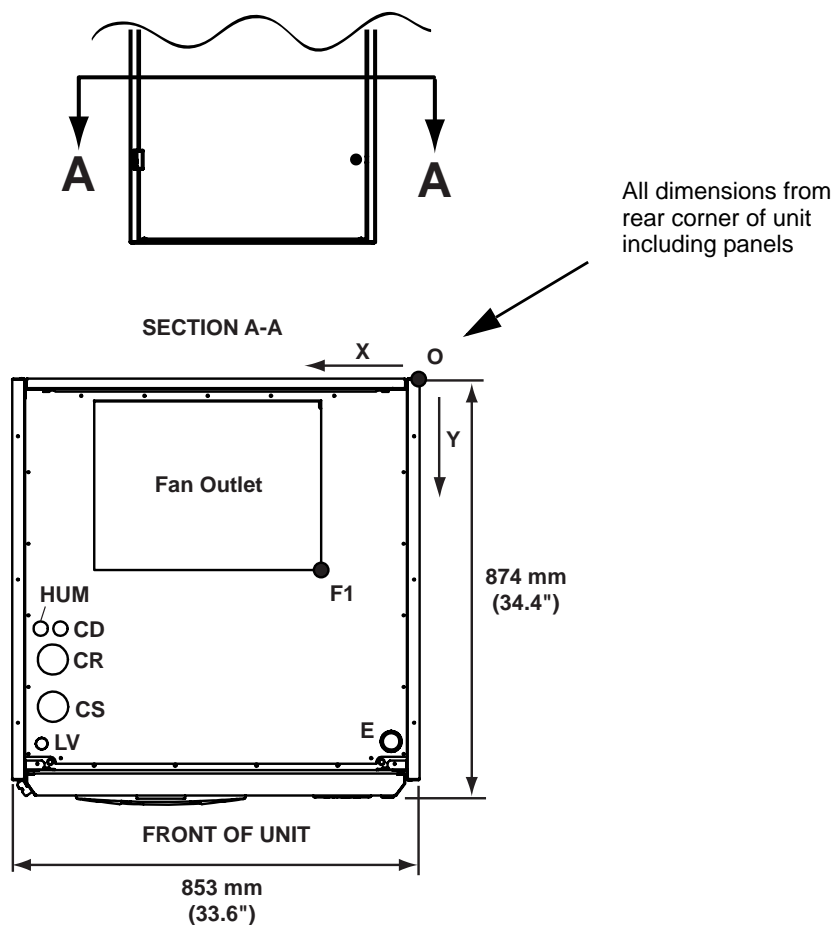
Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)	
				3080U	3090, 3100U**
G1	Hot Gas Circuit 1	964 (38)	665 (26-1/8)	7/8" I.D.	
G2	Hot Gas Circuit 2	2393 (94-1/4)	665 (26-1/8)	7/8" I.D.	
L1	Liquid Line Circuit 1	1034 (40-3/4)	665 (26-1/8)	5/8" I.D.	
L2	Liquid Line Circuit 2	2323 (91-1/2)	665 (26-1/8)	5/8" I.D.	
WS1	Water/Glycol Supply Circ 1	1034 (40-3/4)	665 (26-1/8)	1-3/8" I.D.	1-1/4" I.D.
WS2	Water/Glycol Supply Circ 2	2393 (94-1/4)	665 (26-1/8)	1-3/8" I.D.	1-1/4" I.D.
WR1	Water/Glycol Return Circ 1	964 (38)	665 (26-1/8)	1-1/4" O.D.	
WR2	Water/Glycol Return Circ 2	2323 (91-1/2)	665 (26-1/8)	1-1/4" O.D.	
CD-IR	Condensate Drain (Infrared)*	1717 (67-5/8)	473 (18-5/8)	3/4" BSPM	
	w/Optional Pump	1717 (67-5/8)	473 (18-5/8)	3/8" comp.	
HUM-IR	Humidifier water supply (Infrared)	1562 (61-1/2)	512 (20-1/8)	1/2" BSP	
CD-IE	Condensate Drain (Elect)*	1717 (67-5/8)	473 (18-5/8)	25mm OD (1")	
HUM-IE	Humidifier water supply (Elect)	1562 (61-1/2)	512 (20-1/8)	1/2" BSP	
E	Electrical Conn. (High Volt)	60 (2-3/8)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.	
LV	Electrical Conn. (Low Volt)	2492 (98-1/8)	765 (30-1/8)	25 (1)	
F1	Fan Outlet	185 (7-1/4)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)	
F2	Fan Outlet	1085 (42-3/4)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)	
F3	Fan Outlet	1915 (75-3/8)	311 (12-1/4)	404 x 258 (15-7/8 x 10-1/8)	

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

** Water circuit includes regulating valve and bypass valve

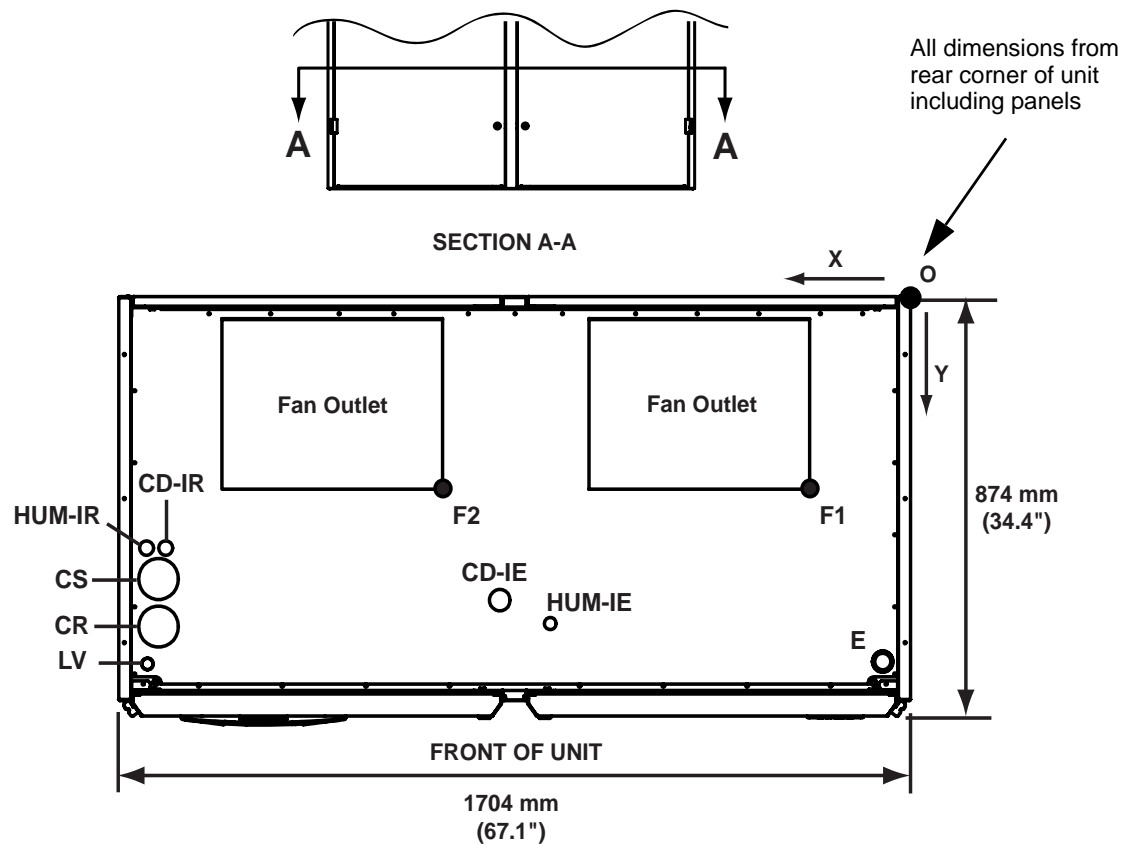
Figure 44 Primary connection locations - 1 bay downflow, chilled water, forward curve fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				1020, 1030, 1040FC
CS	Chilled Water Supply	768 (30-1/4)	588 (23-1/4)	1-1/4" O.D.
CR	Chilled Water Return	768 (30-1/4)	687 (27)	1-1/4" O.D.
CD	Condensate Drain*	752 (29-1/2)	523 (20-1/2)	IR: 3/4" BSPM IE: 1"
	w/Optional Pump	752 (29-1/2)	523 (20-1/2)	3/8" comp.
HUM	Humidifier water supply	794 (31-1/4)	523 (20-1/2)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	792 (31-1/4)	764 (30)	25 (1)
F1	Fan Outlet	206 (8)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

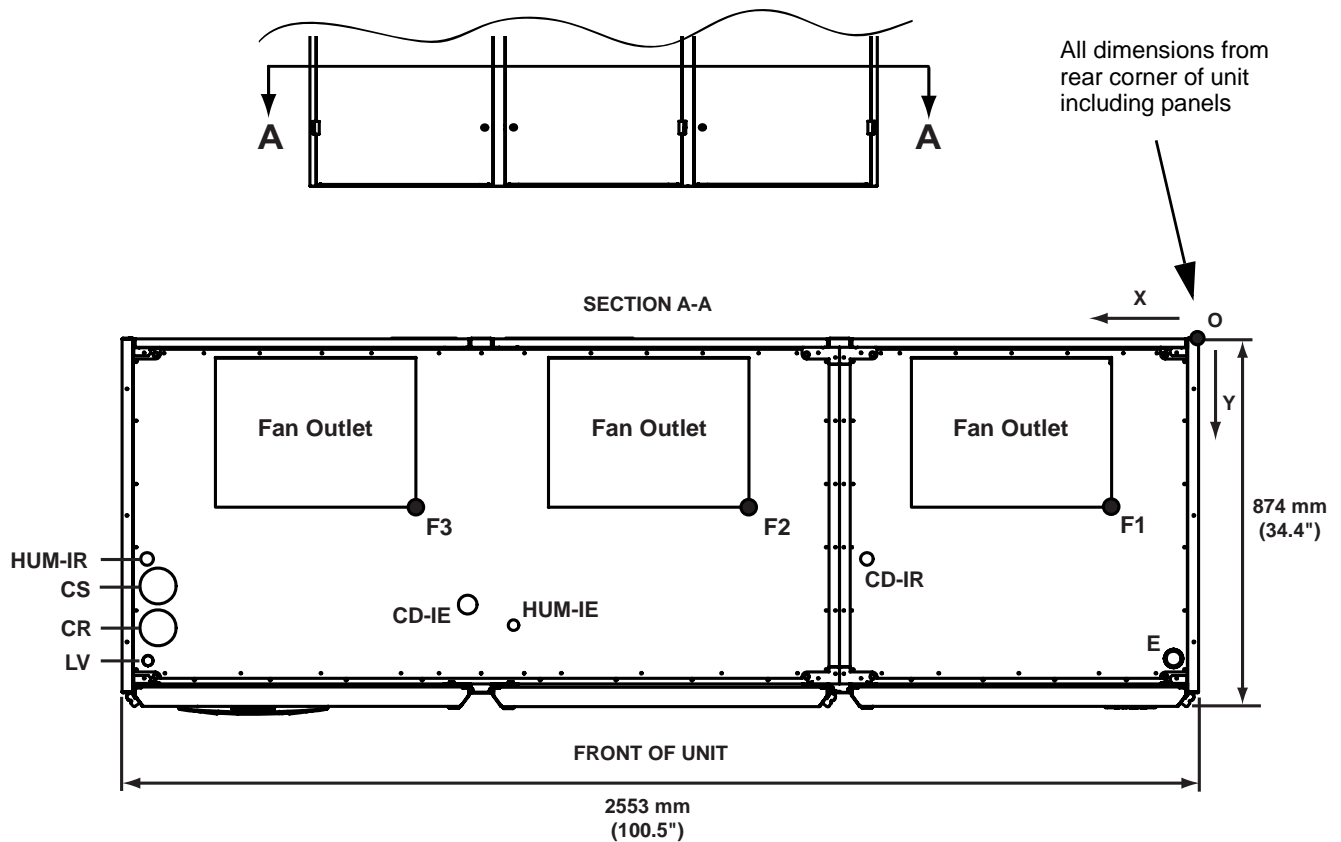
Figure 45 Primary connection locations - 2 bay downflow, chilled water, forward curve fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2050, 2070, 2090FC
CS	Chilled Water Supply	1618 (63-3/4)	588 (23-1/4)	1-5/8" O.D.
CR	Chilled Water Return	1618 (63-3/4)	687 (27)	1-5/8" O.D.
CD-IR	Condensate Drain (Infrared)*	1602 (63)	523 (20-1/2)	3/4" BSPM
	w/Optional Pump	884 (34-3/4)	632 (25)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	1644 (64-3/4)	523 (20-1/2)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	884 (34-3/4)	632 (25)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	775 (30-1/2)	681 (26-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1642 (64-3/4)	764 (30)	25 (1)
F1	Fan Outlet	217 (8-1/2)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)
F2	Fan Outlet	1007 (39-3/4)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

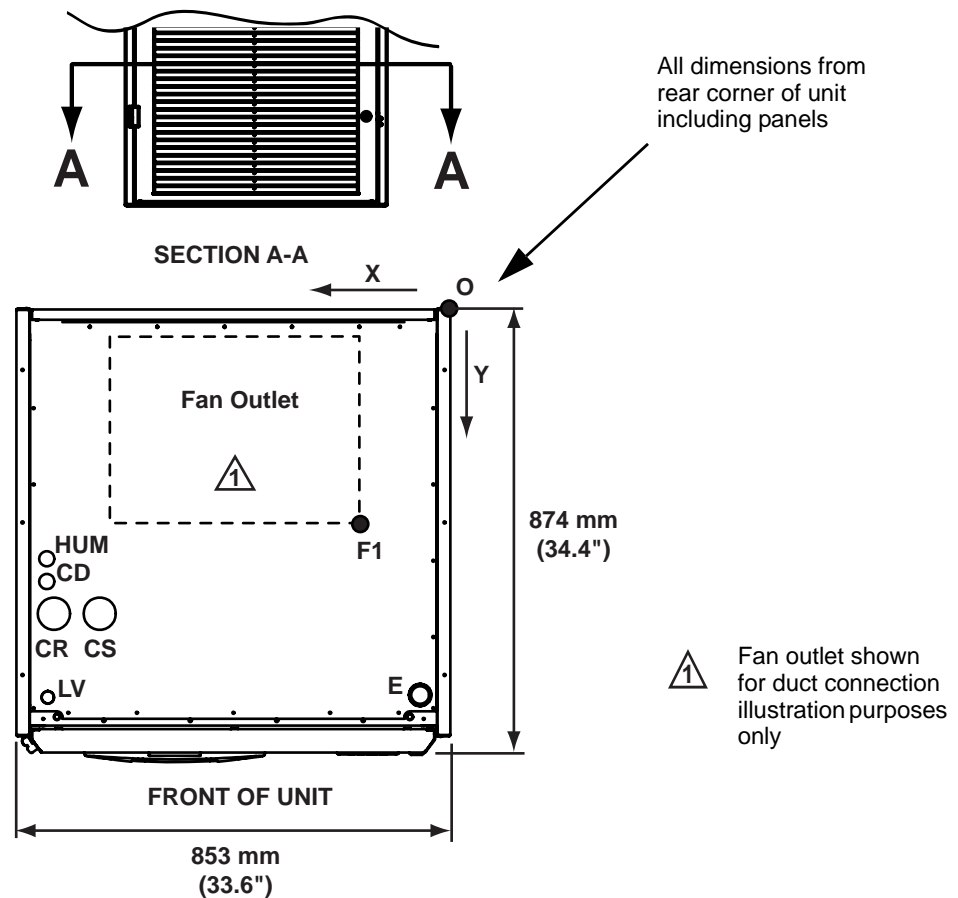
Figure 46 Primary connection locations - 3 bay downflow, chilled water, forward curve fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				3110, 3140FC
CS	Chilled Water Supply	2468 (97-1/4)	588 (23-1/4)	2" O.D.
CR	Chilled Water Return	2468 (97-1/4)	687 (27)	2" O.D.
CD-IR	Condensate Drain (Infrared)*	794 (31-1/4)	523 (20-1/2)	3/4" BSPM
	w/Optional Pump	794 (31-1/4)	523 (20-1/2)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	2494 (98-1/4)	523 (20-1/2)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	1734 (68-1/4)	632 (25)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	1625 (64)	681 (26-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	2492 (98)	764 (30)	25 (1)
F1	Fan Outlet	206 (8)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)
F2	Fan Outlet	1067 (42)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)
F3	Fan Outlet	1857 (73)	401 (15-3/4)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 47 Primary connection locations - 1 bay upflow, chilled water, forward curve fan

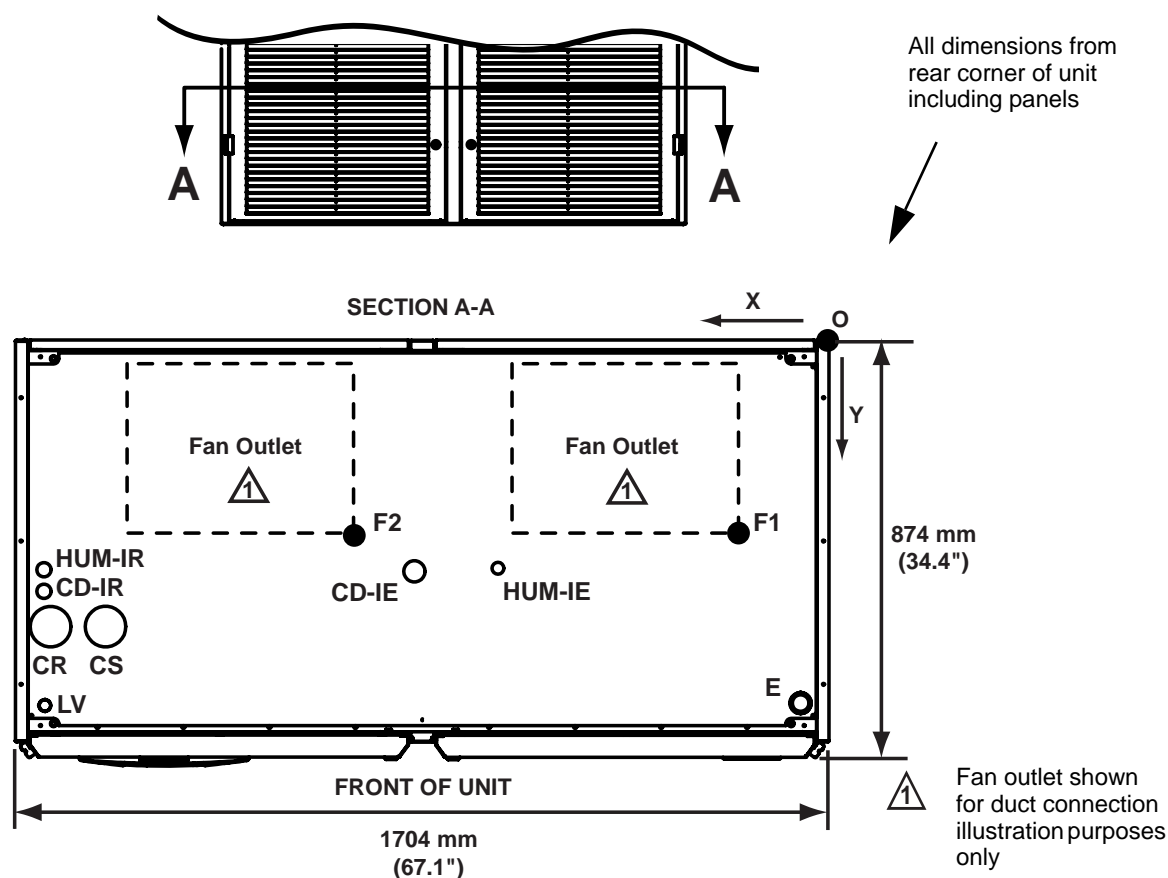


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				1020, 1030UC/DC
CS	Chilled Water Supply	690 (27-1/4)	600 (23-1/2)	1-1/4" O.D.
CR	Chilled Water Return	780 (30-3/4)	600 (23-1/2)	1-1/4" O.D.
CD	Condensate Drain*	794 (31-1/4)	537 (21-1/4)	IR: 3/4" BSPM IE: 1"
	w/Optional Pump	794 (31-1/4)	537 (21-1/4)	3/8" comp.
HUM	Humidifier water supply	794 (31-1/4)	492 (19-1/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	792 (31-1/4)	764 (30)	25 (1)
F1	Fan Outlet	195 (7-3/4)	456 (18)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 48 Primary connection locations - 2 bay upflow, chilled water, forward curve fan

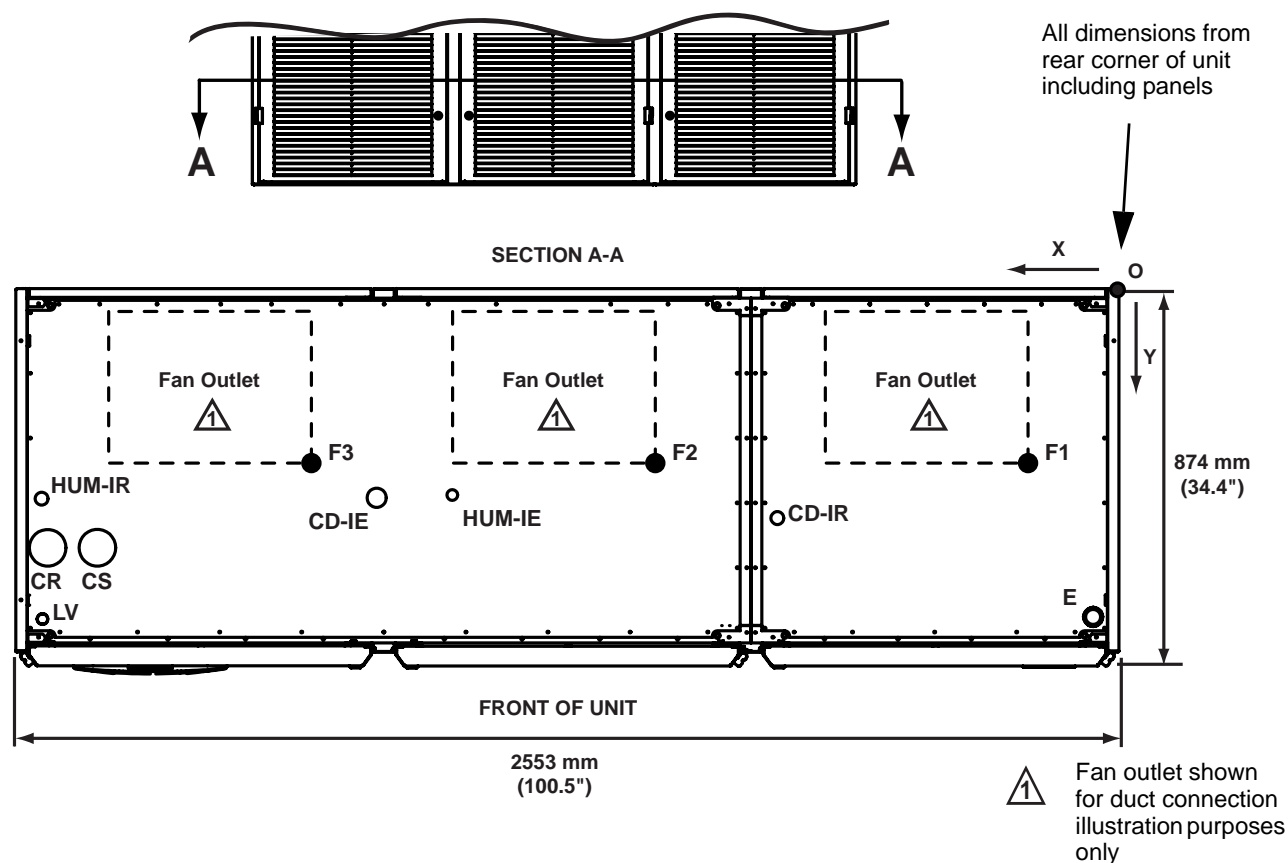


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2050, 2070UC/DC
CS	Chilled Water Supply	1515 (59-3/4)	600 (23-1/2)	1-5/8" O.D.
CR	Chilled Water Return	1630 (64-1/4)	600 (23-1/2)	1-5/8" O.D.
CD-IR	Condensate Drain (Infrared)*	1644 (64-3/4)	537 (21-1/4)	3/4" BSPM
	w/Optional Pump	1644 (64-3/4)	537 (21-1/4)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	1644 (64-3/4)	492 (19-3/8)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	693 (27-1/4)	477 (18-3/4)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	868 (34-1/4)	484 (19)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1642 (64-3/4)	765 (30-1/8)	25 (1)
F1	Fan Outlet	230 (9)	456 (18)	476 x 385 (18-3/4 x 15-1/4)
F2	Fan Outlet	1045 (41-1/4)	456 (18)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 49 Primary connection locations - 3 bay upflow, chilled water, forward curve fan

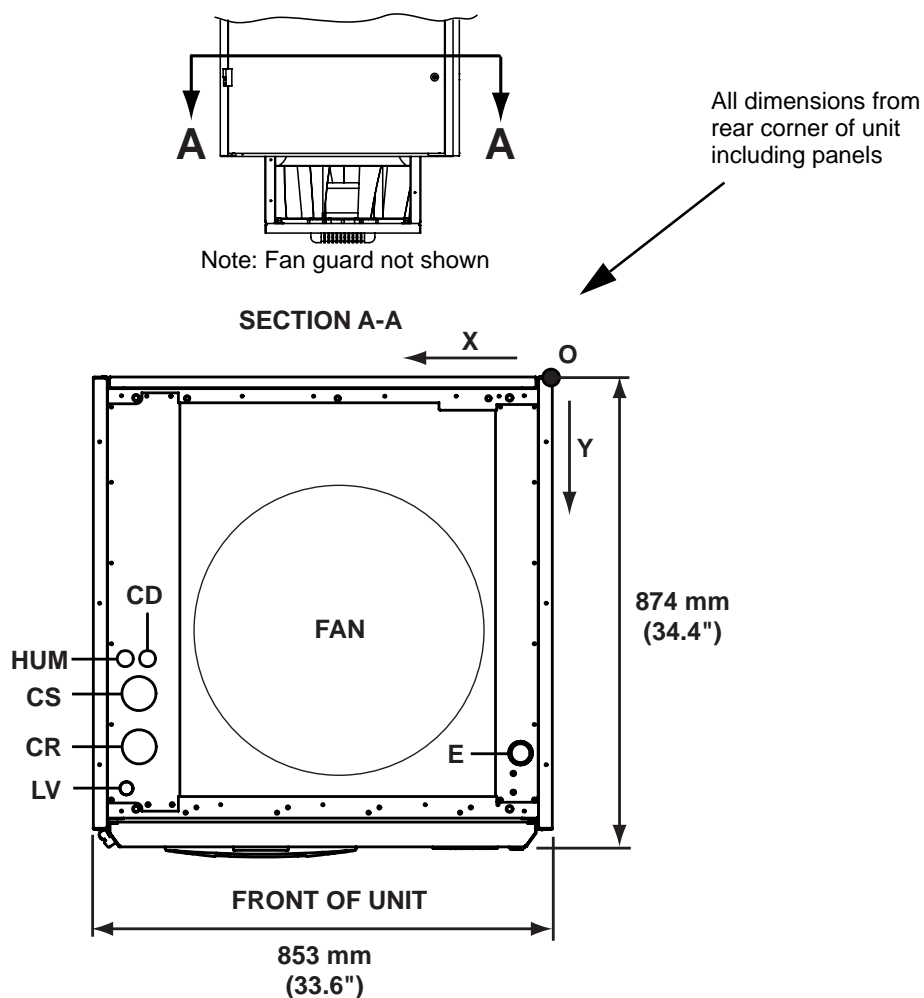


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				3080, 3110UC/DC
CS	Chilled Water Supply	2365 (93)	600 (23-1/2)	2" O.D.
CR	Chilled Water Return	2480 (97-3/4)	600 (23-1/2)	2" O.D.
CD-IR	Condensate Drain (Infrared)*	794 (31-1/4)	537 (21-1/4)	3/4" BSPM
	w/Optional Pump	794 (31-1/4)	537 (21-1/4)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	2494 (98-1/4)	492 (19-1/4)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	1718 (67-3/4)	484 (19)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	1543 (60-3/4)	477 (18-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	2492 (98)	765 (30-1/8)	25 (1)
F1	Fan Outlet	195 (7-3/4)	456 (18)	476 x 385 (18-3/4 x 15-1/4)
F2	Fan Outlet	1080 (42-1/2)	456 (18)	476 x 385 (18-3/4 x 15-1/4)
F3	Fan Outlet	1895 (74-1/2)	456 (18)	476 x 385 (18-3/4 x 15-1/4)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

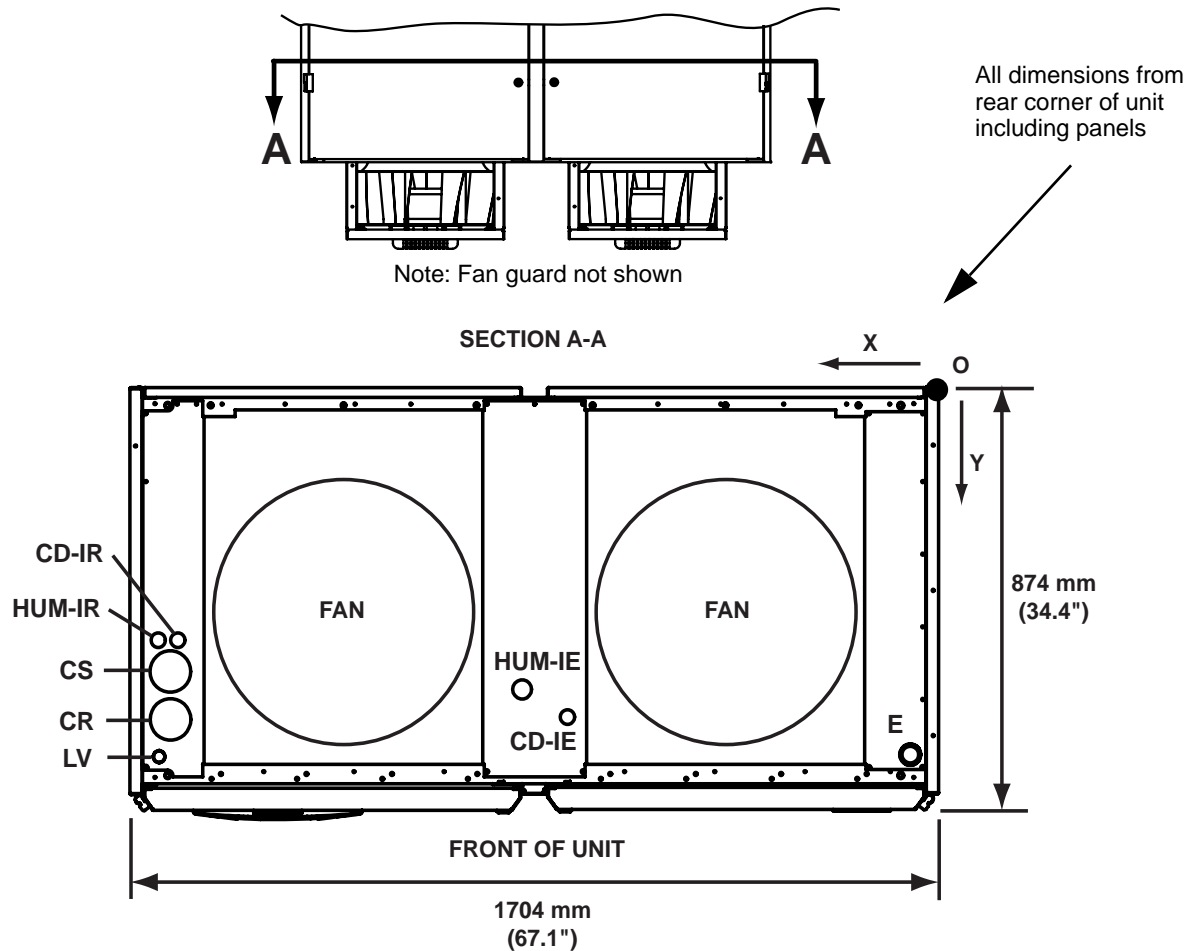
Figure 50 Primary connection locations - 1 bay downflow, chilled water, EC fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				1020, 1030, 1040GC
CS	Chilled Water Supply	768 (30-1/4)	588 (23-1/4)	1-1/4" O.D.
CR	Chilled Water Return	768 (30-1/4)	687 (27)	1-1/4" O.D.
CD	Condensate Drain*	752 (29-1/2)	523 (20-1/2)	IR: 3/4" BSPM IE: 1"
	w/Optional Pump	752 (29-1/2)	523 (20-1/2)	3/8" comp.
HUM	Humidifier water supply	794 (31-1/4)	523 (20-1/2)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	792 (31-1/4)	764 (30)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

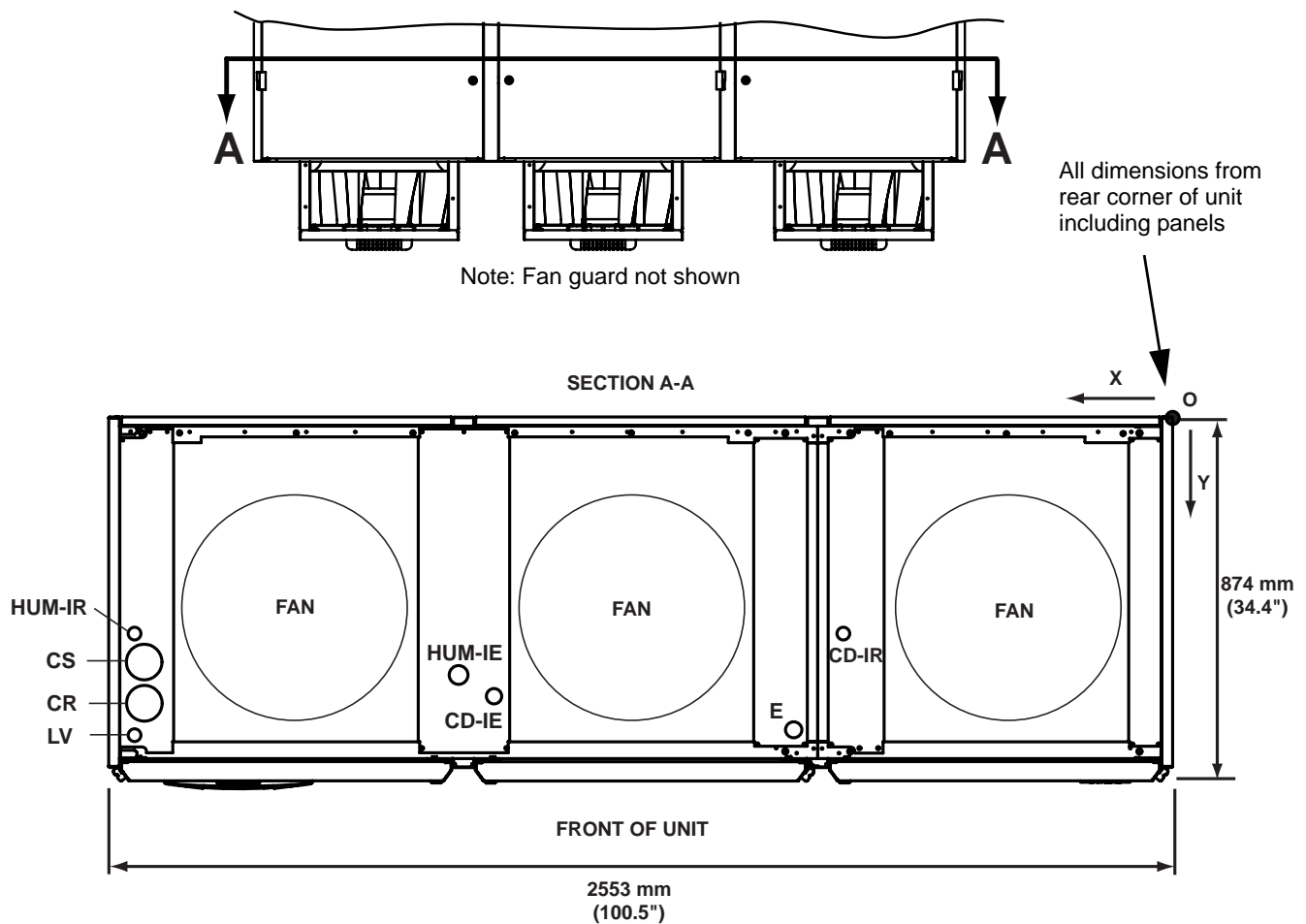
Figure 51 Primary connection locations - 2 bay downflow, chilled water, EC fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2050, 2070, 2090GC
CS	Chilled Water Supply	1618 (63-3/4)	588 (23-1/4)	1-5/8" O.D.
CR	Chilled Water Return	1618 (63-3/4)	687 (27)	1-5/8" O.D.
CD-IR	Condensate Drain (Infrared)*	1602 (63)	523 (20-1/2)	3/4" BSPM
	w/Optional Pump	884 (34-3/4)	632 (25)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	1644 (64-3/4)	523 (20-1/2)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	884 (34-3/4)	632 (25)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	775 (30-1/2)	681 (26-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1642 (64-3/4)	764 (30)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

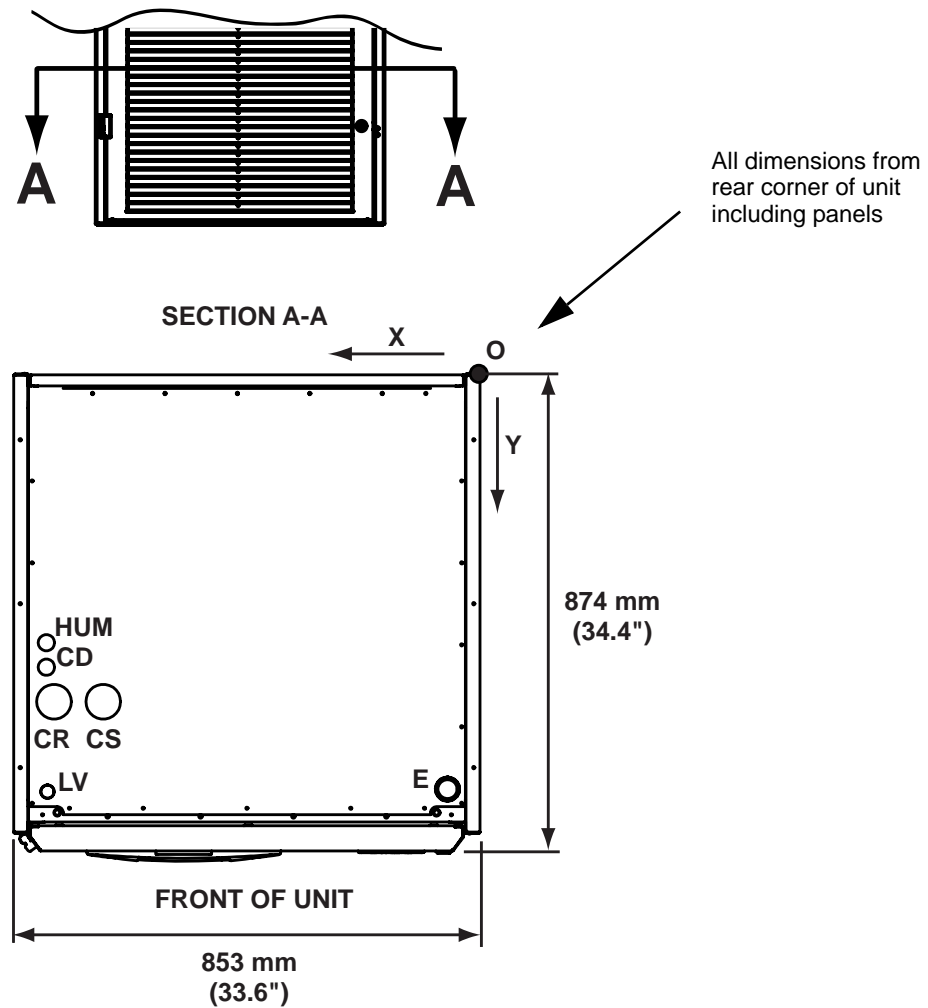
Figure 52 Primary connection locations - 3 bay downflow, chilled water, EC fan



Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				3110, 3140GC
CS	Chilled Water Supply	2468 (97-1/4)	588 (23-1/4)	2" O.D.
CR	Chilled Water Return	2468 (97-1/4)	687 (27)	2" O.D.
CD-IR	Condensate Drain (Infrared)*	794 (31-1/4)	523 (20-1/2)	3/4" BSPM
	w/Optional Pump	794 (31-1/4)	523 (20-1/2)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	2494 (98-1/4)	523 (20-1/2)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	1734 (68-1/4)	632 (25)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	1625 (64)	681 (26-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	2492 (98)	764 (30)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 53 Primary connection locations - 1 bay upflow, chilled water, EC fan

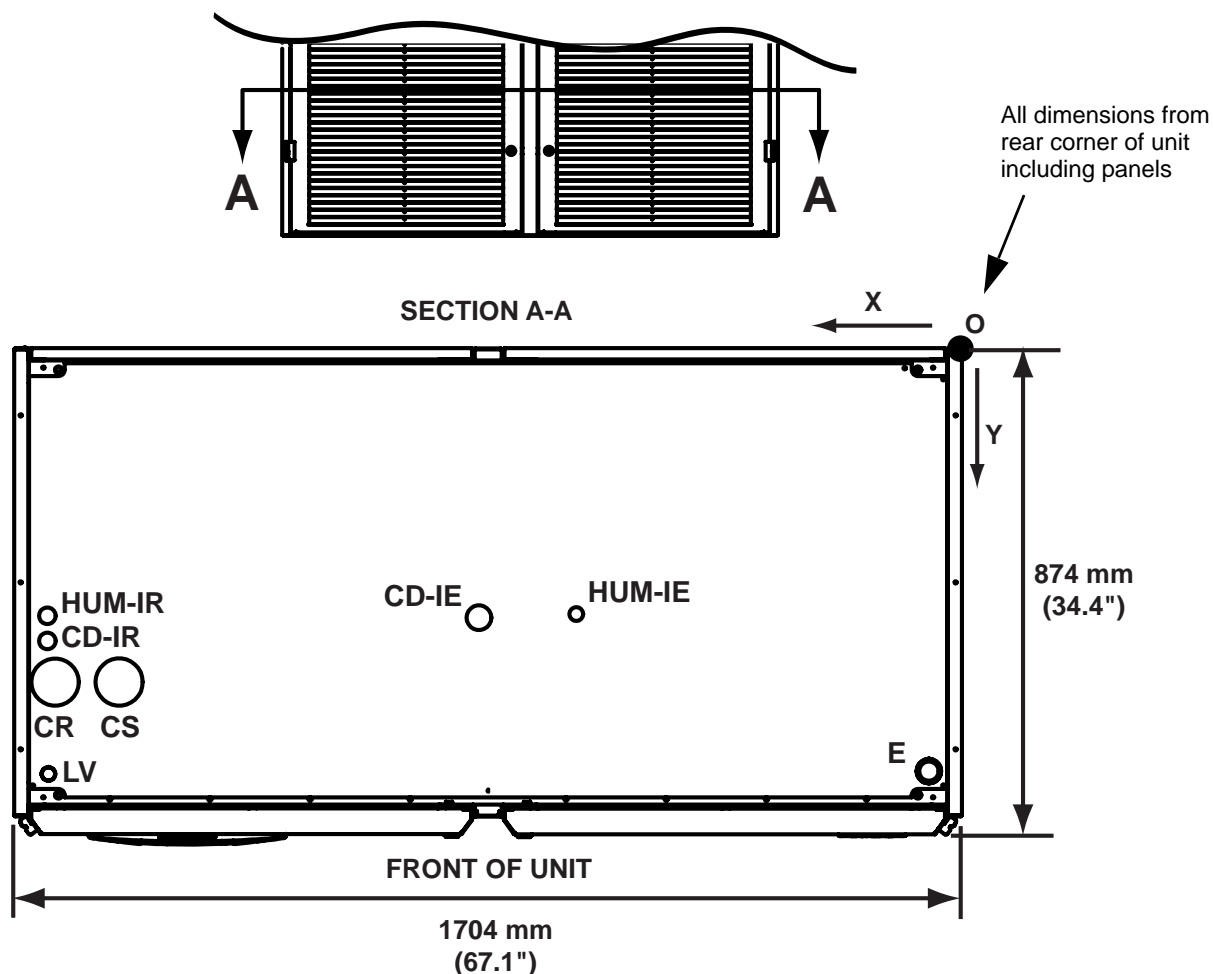


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				1020, 1030VC
CS	Chilled Water Supply	690 (27-1/4)	600 (23-1/2)	1-1/4" O.D.
CR	Chilled Water Return	780 (30-3/4)	600 (23-1/2)	1-1/4" O.D.
CD	Condensate Drain*	794 (31-1/4)	537 (21-1/4)	IR: 3/4" BSPM IE: 1"
	w/Optional Pump	794 (31-1/4)	537 (21-1/4)	3/8" comp.
HUM	Humidifier water supply	794 (31-1/4)	492 (19-1/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	792 (31-1/4)	764 (30)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 54 Primary connection locations - 2 bay upflow, chilled water, EC fan

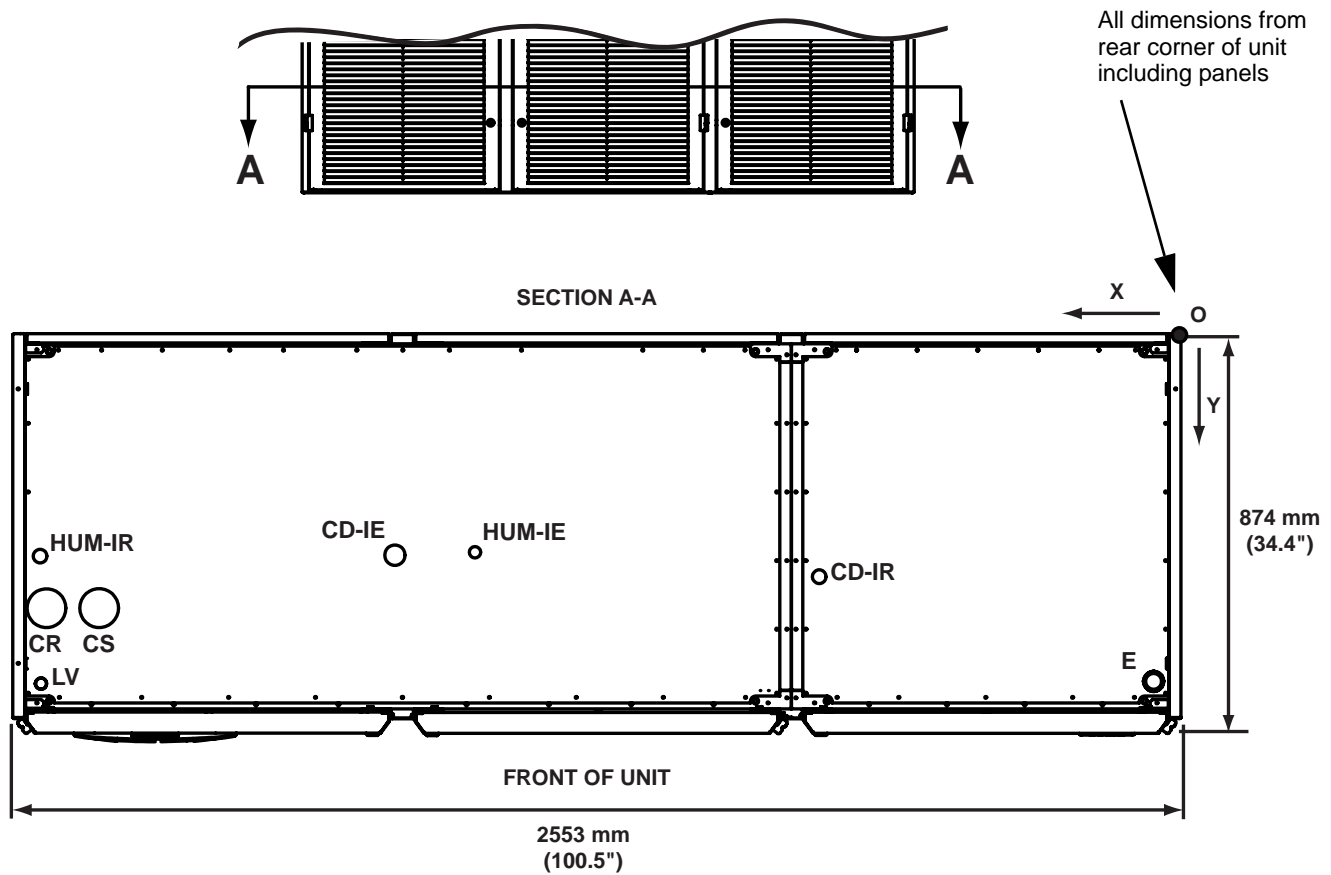


Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				2050, 2070VC
CS	Chilled Water Supply	1515 (59-3/4)	600 (23-1/2)	1-5/8" O.D.
CR	Chilled Water Return	1630 (64-1/4)	600 (23-1/2)	1-5/8" O.D.
CD-IR	Condensate Drain (Infrared)*	1644 (64-3/4)	537 (21-1/4)	3/4" BSPM
	w/Optional Pump	1644 (64-3/4)	537 (21-1/4)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	1644 (64-3/4)	492 (19-3/8)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	693 (27-1/4)	477 (18-3/4)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	868 (34-1/4)	484 (19)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	1642 (64-3/4)	765 (30-1/8)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

Figure 55 Primary connection locations - 3 bay upflow, chilled water, EC fan



Note: Upflow units must be connected to field supplied ductwork or factory discharge air plenum

Point	Description	X mm (in.)	Y mm (in.)	Connection Size/Opening mm (in.)
				3080, 3110VC
CS	Chilled Water Supply	2365 (93)	600 (23-1/2)	2" O.D.
CR	Chilled Water Return	2480 (97-3/4)	600 (23-1/2)	2" O.D.
CD-IR	Condensate Drain (Infrared)*	794 (31-1/4)	537 (21-1/4)	3/4" BSPM
	w/Optional Pump	794 (31-1/4)	537 (21-1/4)	3/8" comp.
HUM-IR	Humidifier water supply (Infrared)	2494 (98-1/4)	492 (19-1/4)	1/2" BSP
CD-IE	Condensate Drain (Elect)*	1718 (67-3/4)	484 (19)	25mm OD (1")
HUM-IE	Humidifier water supply (Elect)	1543 (60-3/4)	477 (18-3/4)	1/2" BSP
E	Electrical Conn. (High Volt)	60 (2-1/4)	760 (29-7/8)	34.9 (1-3/8); 44.4 (1-3/4) K.O.
LV	Electrical Conn. (Low Volt)	2492 (98)	765 (30-1/8)	25 (1)

* Field-pitch condensate drain line a minimum of 10mm per metre (1/8" per ft.). Infrared humidifier units contain a factory installed condensate trap. Do not trap external to unit. Immersed electrode humidifier units require an external trap. Drain line may contain boiling water. Select appropriate drain materials. The drain line must comply with local codes.

9.0 CHECKLIST FOR COMPLETED INSTALLATION

9.1 Moving and Placing Equipment

- ☐ 1. Unpack and check received material.
- ☐ 2. Proper clearance for service access has been maintained around the equipment.
- ☐ 3. Equipment is level and mounting fasteners are tight.
- ☐ 4. If the equipment has been disassembled for installation, unit must be reassembled per instructions.
- ☐ 5. Downflow EC Fan Units - fans lowered into operating position and secured

9.2 Electrical

- ☐ 1. Supply voltage and phase matches equipment nameplate.
- ☐ 2. Wiring connections completed between indoor unit and heat rejection equipment
- ☐ 3. Power line circuit breakers or fuses have proper ratings for equipment installed.
- ☐ 4. Control wiring connections completed between indoor evaporator and heat rejection equipment.
- ☐ 5. All internal and external high and low voltage wiring connections are tight.
- ☐ 6. Confirm that unit is properly grounded to an earth ground.
- ☐ 7. Control transformer setting matches incoming power.
- ☐ 8. Electrical service conforms to national and local codes.
- ☐ 9. Check blowers and compressors (scroll only) for proper rotation.
- ☐ 10. INFRARED HUMIDIFIER UNITS ONLY - Remove lamp protection blocks and rubber band from float switch. Reconnect float switch in-line plug.
- ☐ 11. Factory supplied water under floor sensor (LWD) installed

9.3 Piping

- ☐ 1. Piping completed to refrigerant or coolant loop (if required).
- ☐ 2. Refrigerant check valve installed at condenser correctly (if required).
- ☐ 3. Refrigerant charge calculated and additional oil added to system (if required).
- ☐ 4. Piping had been leak-checked, evacuated and charged (if required).
- ☐ 5. Refrigeration piping is properly sized, sloped, trapped as shown in the piping schematics
- ☐ 6. Check piping inside and outside of equipment for proper support.
- ☐ 7. Ensure that factory clamps have been reinstalled
- ☐ 8. Drain line connected, trapped (if required) and pitched per local code.
- ☐ 9. Water supply line connected to humidifier. Isolation valve opened.
- ☐ 10. Unit baseplate pipe connection openings are sealed.

9.4 Other

- ☐ 1. Ducting complete (if required).
- ☐ 2. Discharge air plenum fitted (if required).
- ☐ 3. Filters installed and airflow direction correct.
- ☐ 4. Check fasteners that secure compressors, reheats, humidifier and motors—some may have become loose during shipment
- ☐ 5. Verify additional water detection is properly installed around all units (recommended)
- ☐ 6. Blower drive system rotates freely.
- ☐ 7. Installation materials and tools have been removed from equipment (literature, shipping materials, construction materials, tools, etc.)

10.0 INITIAL STARTUP CHECKS AND COMMISSIONING PROCEDURE FOR WARRANTY INSPECTION



WARNING

Risk of electric shock. Can cause injury or death

Disconnect local and remote power supplies before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.



WARNING

Risk of improper wiring, piping, moving, lifting and/or handling. Can cause equipment damage, injury or death.

Only qualified service personnel should move, install or service this equipment.

Read all installation, operating and safety instructions before proceeding.

Read and follow all warnings on page 1 and elsewhere in this manual.



WARNING

Risk of fire suppression and alarm system activation. Can cause injury during building evacuation and mobilization of emergency fire and rescue services.

Startup operation of optional electric reheat elements may activate facility alarm and fire suppression system. Prepare and take appropriate steps to manage this possibility. Activating reheat during initial startup may burn-off particulate from electric reheat elements.

Before beginning initial startup checks, make certain that unit was installed according to the instructions in this manual. All exterior panels must be in place.

- Confirm that all items in **9.0 - Checklist for Completed Installation** have been done.
- Contact your local Emerson sales representative or Emerson Air Product Support if you have any questions or problems during unit startup and commissioning.

Liebert PEX Warranty startup procedure includes the following steps. These steps must be completed to validate warranty.



NOTE

Unauthorised operation/startup of the system may void the warranty. Contact your local Emerson office to arrange commissioning.

10.1 Information for Warranty Inspection—Remove Power From Unit Input Isolator

Complete the following items on the warranty inspection form:

- Installer and address
- Owner and address
- Site Contact name and phone
- Installation date
- Indoor unit model and serial number
- Outdoor unit (condenser or drycooler) model and serial number
- Condition of unit when received
- Is there a freight damage claim in process?
- Have manuals been kept with unit?
- Is the air product connected to site monitoring or switchover controls?
- Provide model and serial number of connected controls for switchover controls

10.2 Startup Checks Inspection With Panels Removed and Input Isolator Switch Off

1. Check all internal piping clamps and tighten or secure if needed.
2. Check field piping for proper support
3. Check unit electrical connections and tighten or secure if needed. Check control plugs and Mate N' Loc connections to the control boards and components.
4. Check all major components such as compressors, reheats, humidifiers and motors that may have loosened during shipping.
5. Remove all debris, tools and documents from unit area.
6. Store user manual/unit documentation in document pocket located inside LHS door.
7. Record fan motor power and voltage from nameplate
8. Record belt size, motor and fan pulley (if applicable)
9. Record filter size and quantity
10. Record piping size for discharge and liquid lines,.
11. Check piping for proper traps including inverted traps or check valves on condensers.
12. Record total equivalent length for discharge and liquid piping.
13. Record compressor(s) model and serial number.
14. Record unit configuration and verify with the startup document.

10.3 Commissioning Procedure With Panels On



NOTE

Unauthorised operation/startup of the system may void the warranty. Contact your local Emerson office to arrange commissioning.

1. Disconnect all power to the environmental control unit and check.
2. Open all line voltage circuit breakers except the main fan circuit breaker and the control voltage circuit breaker in the electric panel. (Use iCOM to activate loads).
3. Turn on power to the unit and check line voltage on main unit input isolation switch. Line voltage must be within 10% of nameplate voltage.
4. Turn ON the main unit input isolation switch and check secondary voltage at transformer T1. Voltage at T1 must be 24VAC \pm 2.5VAC (check at TB1-1 and TB1-5). T1 voltage must not exceed 28VAC. Change primary tap if necessary.
5. Push the iCOM ON-OFF button. The fan(s) will start and ON lamp will light. Check fan rotation if not correct make necessary changes to the line side of the unit disconnect with power OFF. **(The unit is phased from the factory.)**
6. Your unit will operate at the factory set configuration for all component operations. The operator may set the values for Temperature and Humidity setpoints, the Proportional Band and the Deadband. The USER Menu may used to set the alarms and other control functions. Refer to iCOM User manual, 051536, for large or small display operation and settings.
7. Turn OFF the unit by the ON-OFF button and then remove power from the main unit input isolation switch and check with a meter.
8. Close all load circuit breakers you opened in **Step 2**.
9. Restore power to unit; turn ON the main unit input isolation switch, press the ON-OFF button.
10. Check and record the current draw on all line voltage components and match with rating plate.



NOTE

*Electric Reheat. See **Warning on page 68**. Activate for a minimum of five (5) minutes.*

11. Check for unusual noises and vibration.
12. Check all refrigerant and water lines for leaks.
13. Record all of the following:
 - a. All component voltages and current draws
 - b. All air / water temperatures indoor and outdoor
 - c. All refrigerant and water / glycol pressures
 - d. All levels of refrigerant and oil in sight glasses
 - e. Record refrigerant pressure switch settings and operating pressures
 - f. Record superheat and sub-cooling. Note: unit superheat can be adjusted at the TX valve and should be in the range of 5-8K (10 to 15F).
14. Test all control sequences and functions of your unit for proper operation. Use iCOM User Manual (051536) for guide to system control operations.

11.0 MAINTENANCE



WARNING

Risk of electric shock. Can cause injury or death.

Disconnect local and remote power supplies before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.



WARNING

Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, injury or death.

Only qualified service personnel should work on this equipment.

Read all installation, operating and safety instructions before proceeding.

Read and follow all warnings in this manual

The Liebert PEX product is a single component in the facility heat removal system. The system includes air distribution (raised floors, duct systems), outdoor heat rejection (condensers, pumps, dry-coolers, cooling towers, piping, heat rejection fluid, ambient temperature, etc.) and indoor cooling and humidity loads (equipment load, location, outside air infiltration). Proper application and maintenance of the entire system is critical to the life and reliability of the Liebert PEX.

- Good maintenance practices are essential to minimizing operation costs and maximizing product life.
- Read and follow monthly and semi-annual maintenance schedules included in this manual. These MINIMUM maintenance intervals may need to be more frequent based on site-specific conditions.
- See the iCOM user manual, 051536, for instructions on how to utilize the unit controller to predict some service maintenance intervals.
- Emerson recommends the use of trained and authorized service personnel, extended service contracts and factory-specified replacement parts. Contact your local Emerson representative.

11.1 Filters



CAUTION

Risk of improper filter installation and filter collapse. Can cause equipment damage.

To maximize the performance and reliability of Liebert PEX equipment, use only Emerson filters. Contact your local Emerson representative to order replacement filters.

Table 18 Filter quantities, downflow units

Unit Size	Filter Size Width x Length	Filter Quantities
		100mm (4") Filter G4 (Merv 8)
1 Bay	785 x 785mm (31 x 31in.)	1
2 Bay		2
3 Bay		3

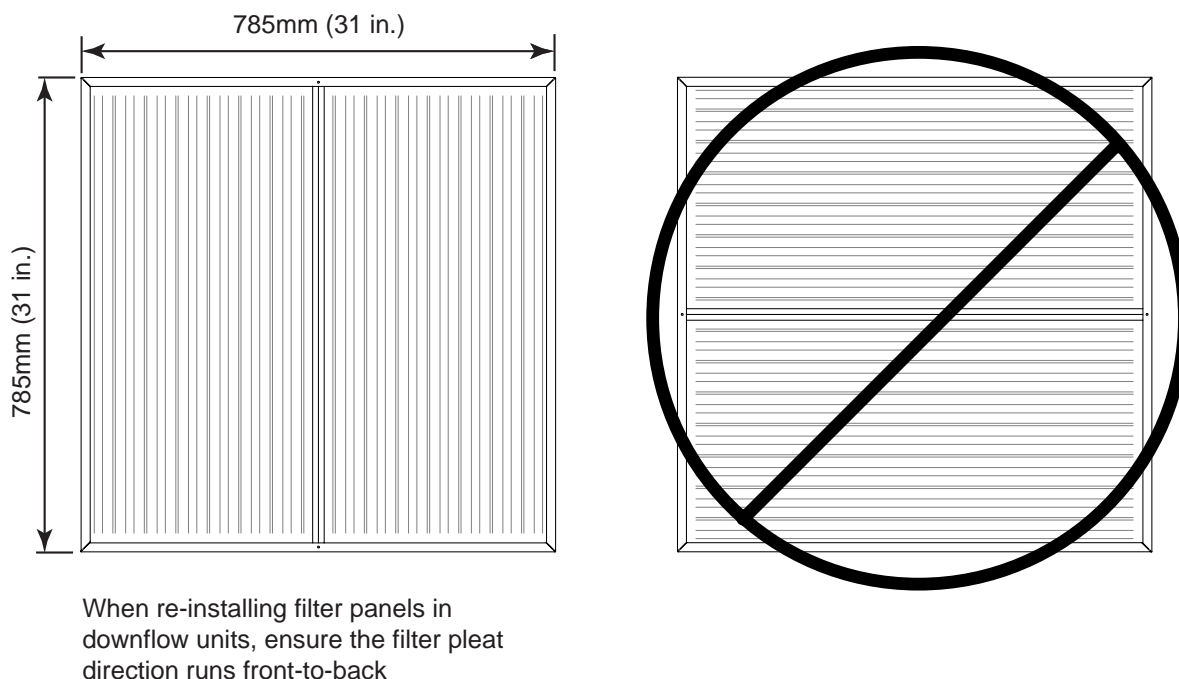
Table 19 Filter quantities, upflow units

Unit Size	Filter Size Width x Length	Filter Quantities
		100mm (4") Filter G4 (Merv 8)
1 Bay	785 x 650mm (31 x 25.5in.)	1
2 Bay		2
3 Bay		3

11.1.1 Filter Replacement Procedure

1. Disconnect power to unit.
2. Open the front doors and remove or slide-out the used filters from the unit.
3. Replace with new filters (install filters according to airflow direction arrow)
4. Test the operation of the filter clog switch.
(The unit fan access panels must be in place and closed to accurately find this point).
5. Operate the blower and set the switch counterclockwise until the alarm is energized.
6. Turn the adjusting knob one turn clockwise or to the desired filter change point.

Figure 56 Proper filter pleat direction



11.2 Blower System - Belt Drive

The blower system employs a self-tensioning belt drive that automatically provides optimum belt tension. Components that are part of the maintenance schedule include the blower wheel(s), drive shaft, bearings, pulleys, belts, motor base and motor. See **HVAC Maintenance Checklist on page 83**.



WARNING

Risk of crushing and pinching action from pivoting motor base. Can cause serious injury to hands and fingers.

Improper drive belt removal may cause the motor base to slam down suddenly. Read the directions in this manual before servicing the belts, motors or pulleys. Follow all directions when servicing the unit.

11.2.1 Belt Removal

1. Disconnect power to unit. Refer **Figure 57 - Fan Belt Removal**.
Do not pry the belts off the pulleys.
2. For downflow units - place a large screwdriver or suitable lever between the motor carrier plate and fan frame. Carefully raise the motor to reduce belt tension sufficient to remove the belt. Remove belt and lower the motor carrier plate.
3. For upflow units - push up on the motor to overcome the belt tension. Remove belt and lower the carrier plate until it rests against the 'stops' on the fan frame.

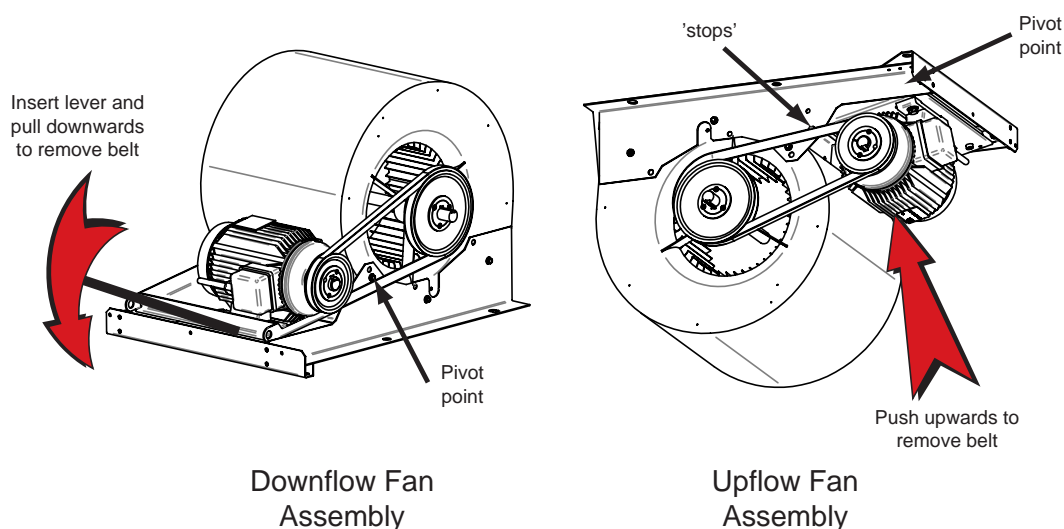


Figure 57 Fan Belt Removal

11.2.2 Belt Installation

1. Select the appropriate replacement B-section belt and position on the fan pulley.
To maximize performance and reliability of Liebert PEX equipment, replace with the same belt specification. Contact your local Emerson representative for replacement belts.
2. Prepare to fit the belt by following the steps in **Section 11.2.1**.
3. Fit the belt onto the motor pulley and carefully lower the motor to tension the belt.
4. The drive is auto-tensioning so no adjustments are necessary.

Fan Bearing Maintenance

- Field lubrication is NOT required for the life of the bearing.
- Bearings are permanently sealed and self-lubricating and cannot be greased.

Fan Bearing Inspection

1. Disconnect power to unit.
2. Remove drive belts (see **11.2.1 - Belt Removal**).
3. Inspect bearing for tightness of set screws and rubber collar condition.
4. Rotate fan wheel by hand.
5. Listen for *unusual* noise and look for signs of *unusual* play.

Fan Bearing Replacement

1. To maximize performance and reliability of Liebert PEX equipment, use only factory approved bearings. Contact Emerson Spare Parts to order replacement bearings.
2. Properly mount and align bearings on shaft. Tighten set-screws in proper sequence and to proper torque using a torque wrench in accordance with the manufacturer's instructions.

Fan Motor

Inspect motor at regular intervals.

Fan Motor Lubrication

- Motors comes pre-lubricated from the factory.
- Bearings are permanently sealed and self-lubricating and cannot be greased.

Fan Wheel

Check to see if wheel(s) are tightly mounted on fan shaft. Rotate wheel(s) and make sure they do not rub against fan housing. The wheel(s) should be periodically cleaned of dirt and debris.

11.3 Blower System - Direct Drive (EC Fans)

The blower system comprises a integrated backward curve centrifugal fan coupled to an EC motor and requires little/no maintenance. The motor is fed with 400V 3 phase power and uses a 0-10VDC signal from the iCOM controller for speed control.

Blower drive system components that are part of the maintenance schedule include the blower. See **HVAC Maintenance Checklist** on page 83.



WARNING

Risk of crushing and pinching action from pivoting fan motor assembly. Can cause serious injury to hands and fingers.

Read the directions in this manual before servicing the blower system. Follow all directions when servicing the unit.

Do not remove installation handle from unit. Return to storage position when not in use.

Fan motor assembly mass approximately 50kg (110lb.).

11.3.1 Removal - Downflow Chilled Water Units

1. Shut down unit and isolate power.
2. Remove the fan access panels and horizontal support channels. Retain all fasteners.
3. Remove the infrared humidifier assembly (Models P1040GC, P2090GC, P3140GC only).
4. Remove the base plate fill panel at the rear of the fan assembly.
5. Remove the front centre mullion using a 3mm hex key (Models P2090GC and P3140GC only).
6. Locate the installation handle and M8 fixing screws in the rear of the unit, and attach the handle to the fan assembly in location A using the same screws. Refer to Position 1 in **Figure 58**.
7. Slowly pull on the handle until the fan assembly is in Position 3. Refer **Figure 59**.
8. Place a supporting piece of timber underneath the fan.
9. Remove the handle and, using the opposite end, refit the handle in location B on the fan plate as shown in Position 4.
10. Pull on the handle until the fan is in Position 5.
11. Remove the motor cover plate and disconnect the wiring.
12. Remove the top plate to access the fan motor assembly.
13. Reverse the procedure to install the new fan motor.

Figure 58 EC Fan motor removal procedure - handle fixing location

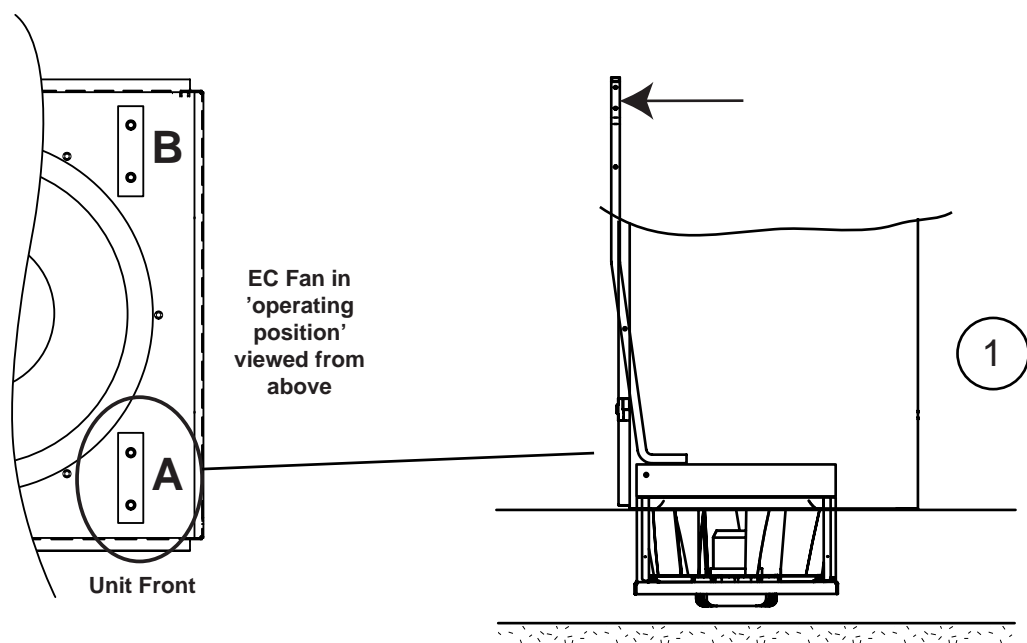
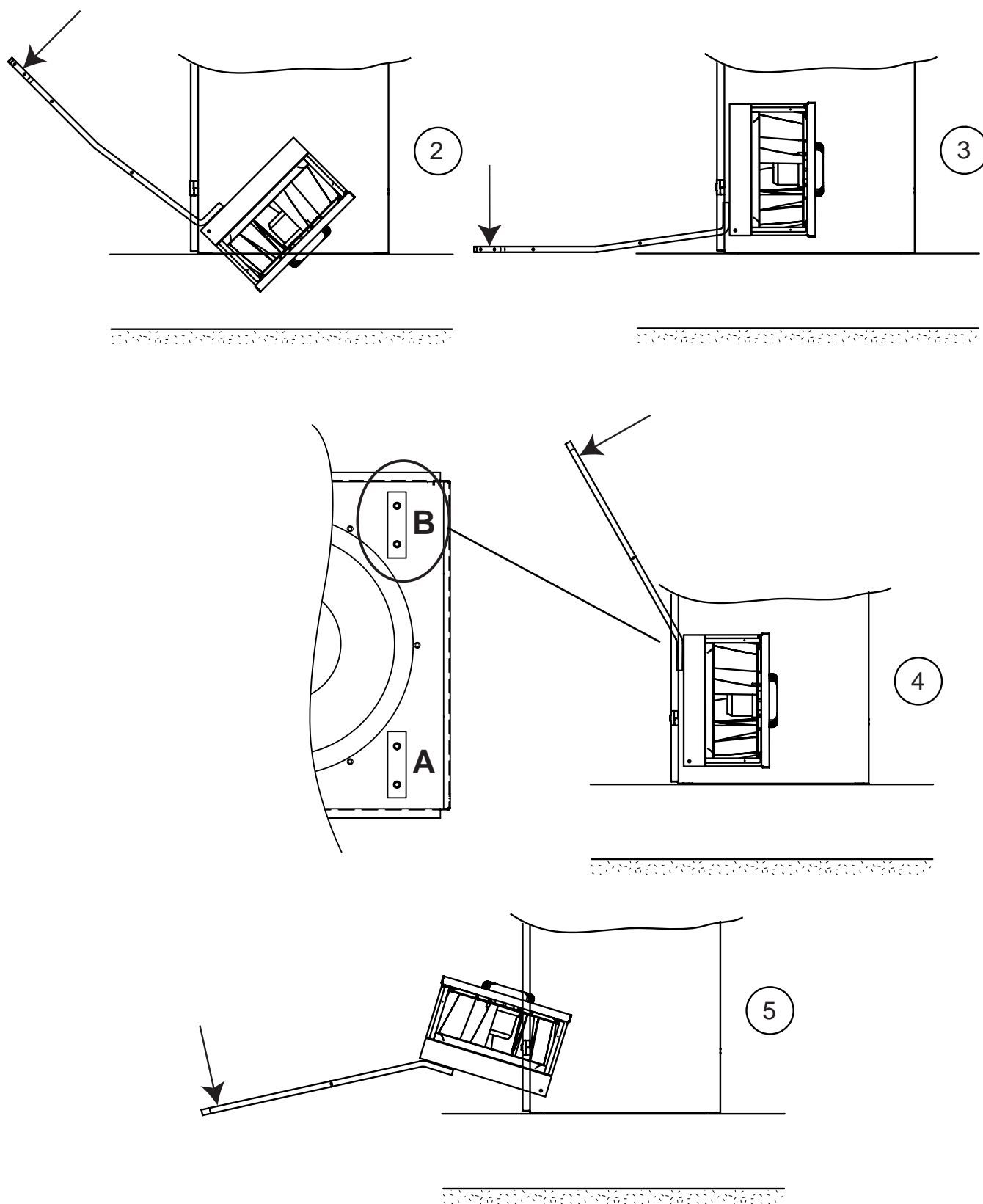


Figure 59 EC fan motor removal procedure



11.4 Infrared Humidifier

During normal humidifier operation, deposits of mineral solids will collect in humidifier pan and on the float switch. These must be cleaned periodically to ensure proper operation. Frequency of cleaning must be locally established since it is dependant on humidifier usage and local water quality. A spare pan is recommended to reduce maintenance time at unit. The Liebert autoflush system can greatly increase the time between cleanings, but does not eliminate the need for periodic checks and maintenance (see iCOM user manual 051536 for autoflush setup). To help reduce excessive scaling in locations with difficult water quality, the use of Vapure is recommended (contact your local Emerson representative).



NOTE

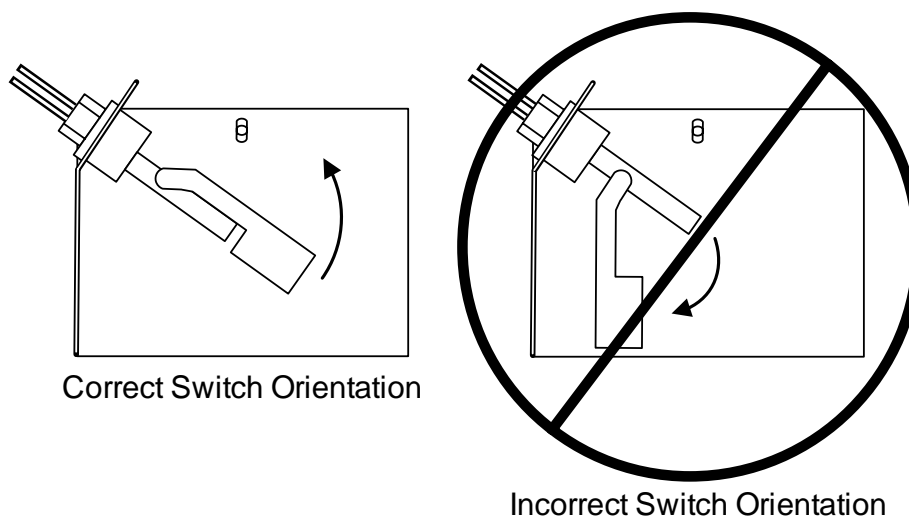
The fill solenoid valve is a pilot assisted design and relies on supply water pressure to operate. When energised it may 'buzz' indicating a loss of water supply. This condition is normal and not a valve fault. Check water supply and confirm all isolation valves are open.

11.4.1 Cleaning Humidifier Pan and Float Switch

Before turning off unit:

1. With unit operating, remove call for humidification at iCOM control.
2. Let blower operate 5 minutes to allow humidifier and water to cool.
3. If unit has a condensate pump, turn unit OFF at iCOM control.
4. Remove centre frame mullion using a 3mm hex key (2 & 3 bay units only).
5. Pull out humidifier standpipe in pan.
6. Inspect O-ring (replace if necessary).
7. Let pan drain and condensate pump operate (if applicable).
8. Disconnect power from unit.
9. Disconnect drain coupling from bottom of pan.
10. Remove thermostat from bottom of pan and retaining screws from sides of pan.
11. Slide pan out.
12. Loosen scale on side and bottom of pan with a stiff nylon brush or plastic scraper.
13. Flush with water
14. Carefully clean scale on float switch (make sure to reinstall correctly (see **Figure 60**)).
15. Reinstall pan, thermostat, standpipe, drain coupling and screws into humidifier.
16. Refit centre frame mullion (if applicable).
17. Operate humidifier and check for leaks.

Figure 60 Correct orientation of float switch



11.4.2 Changing Humidifier Lamps

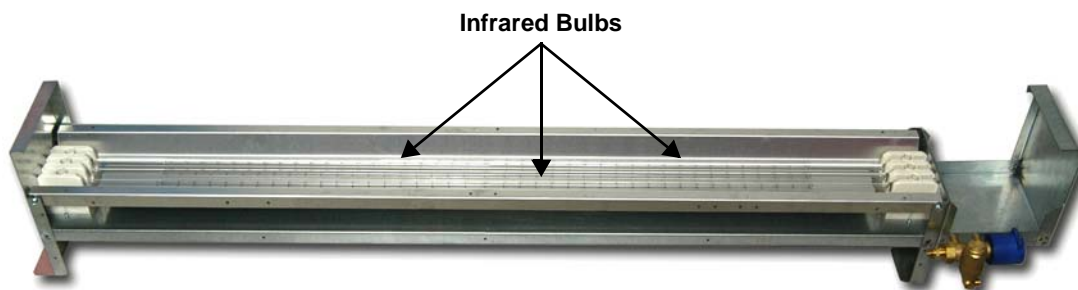


NOTE

Touching quartz lamps with bare hands will severely shorten bulb life. Skin oils create hot spots on lamp surface. Wear clean cotton gloves when handling lamps.

1. Remove humidifier pan (see **11.4.1 - Cleaning Humidifier Pan and Float Switch, Steps 1 through 11**).
2. Disconnect power from unit.
3. At humidifier, remove screws and cover from high voltage compartment.
4. Disconnect one end of purple jumper wires.
5. Using a continuity meter, locate burned out lamp.
6. Remove lamp brackets under lamps.
7. Loosen two screws securing lamp lead wires to junction block.
8. Pull bulb straight down and discard.
9. Wrap lead wires once around new lamp's metal ends. This will support lamp and allow for thermal expansion. Insert lead wires into junction block and torque screws to 3.4 N-m (30 in-lb).
10. Reassemble by reversing **Steps 1 through 9**.

Figure 61 Infrared humidifier lamps



11.5 Immersed Electrode Humidifier

During normal humidifier operation, mineral deposits will collect in the humidifier bottle, on the electrodes and water level sensor. Regular inspection and cleaning is necessary to ensure proper operation. The frequency is dependant on humidifier usage and local water quality. Refer **Figure 63** for details on alternate electrode orientations. The humidifier employs an automatic flush cycle that allows application in a wide range of water conditions (see iCOM user manual 051536 for flush cycle setup). The humidifier is fully serviceable ensuring quick and cost effective maintenance.



WARNING

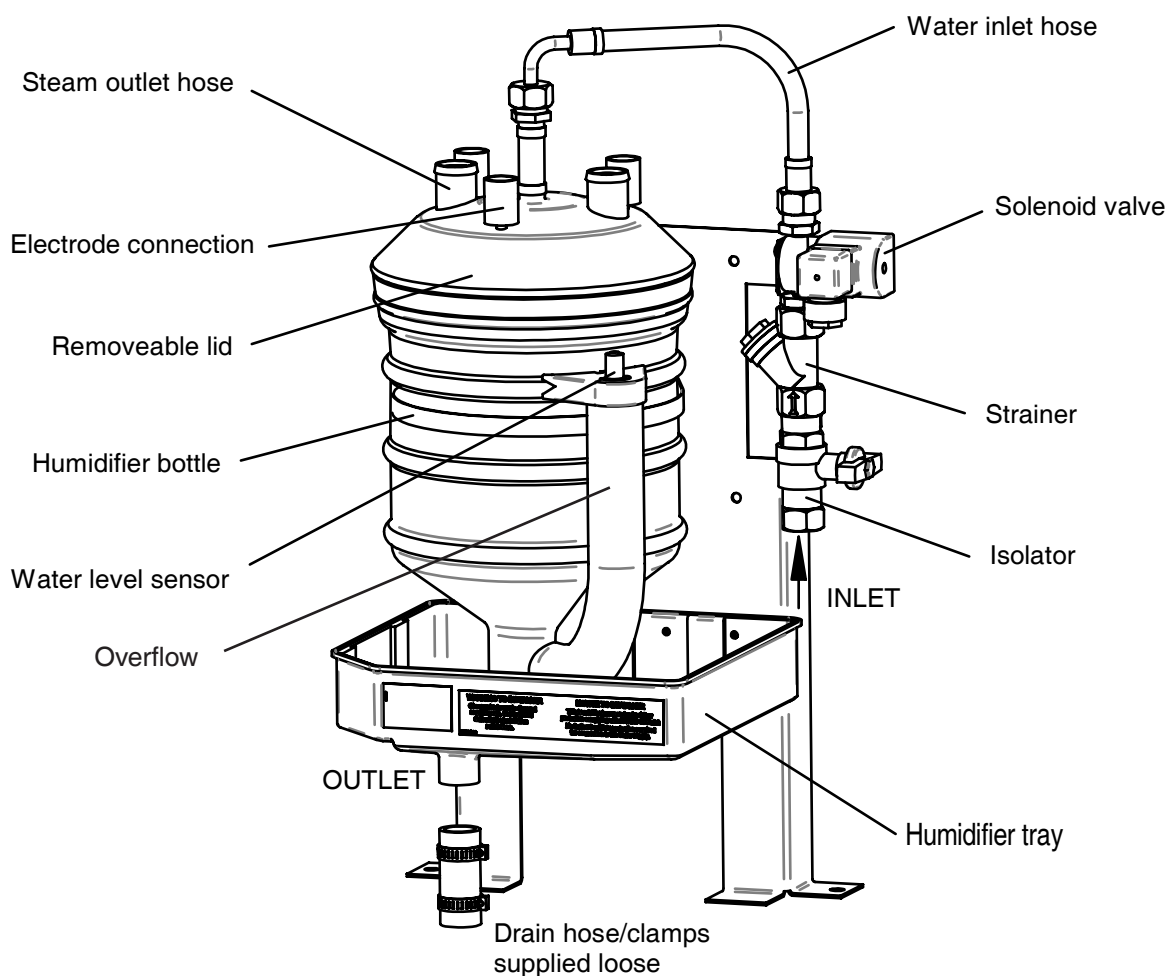
Risk of electric shock. Can cause injury or death.

Disconnect local and remote power supplies before working on humidifier.

Risk of contact with hot surfaces. Can cause injury.

Allow sufficient time to cool. Wear protective gloves when working on or near humidifier.

Figure 62 Immersed electrode humidifier

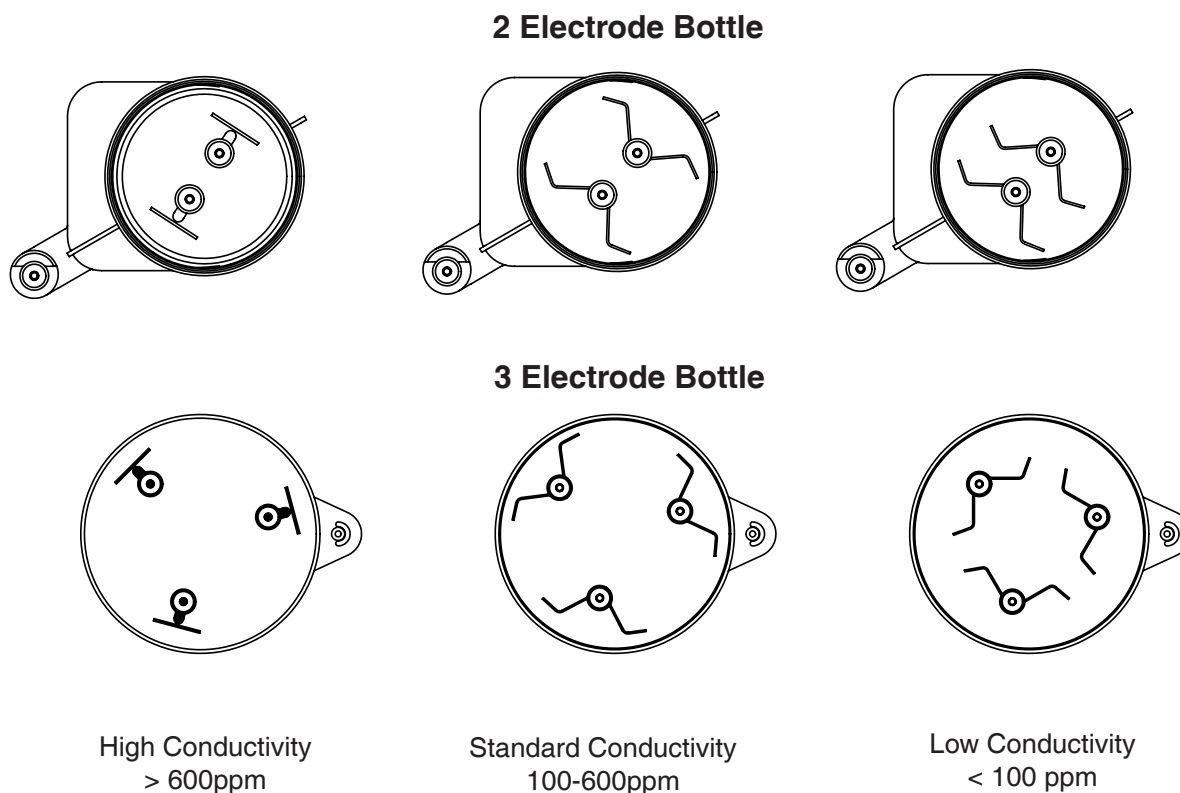


11.5.1 Cleaning Humidifier Bottle, Electrodes and Steam Pipe

Before turning off unit:

1. With unit operating, remove call for humidification at iCOM control.
2. Manually flush the humidifier to cool down the bottle contents.
3. Let fans operate 5 minutes to allow steam pipe(s) to cool.
4. If unit has a condensate pump, turn unit OFF at iCOM control.
5. Turn off humidifier circuit breaker.
6. Remove water level sensor and cover from overflow. Remove any scale/buildup.
7. Carefully remove lid and inspect o-ring.
8. Inspect and clean electrodes. Replace if necessary. Check orientation and re-tighten.
9. Loosen velcro strap and carefully drain bottle into the tray. Dispose of scale deposits separately.
10. Inspect bottle, clean and/or replace (if necessary).
11. Reassemble lid to bottle. Resecure strap.
12. Check all hose connections.
13. Inspect and clean steam distribution pipe(s).
14. Turn on humidifier circuit breaker.
15. Restart unit.
16. Operate humidifier and check for leaks.

Figure 63 Electrode orientation for different water qualities



11.6 Condensate Drain and Condensate Pump Systems

11.6.1 Condensate Drain

Check and clear obstructions in tubing during routine maintenance.

11.6.2 Condensate Pump

- Disconnect power to unit using main input isolation switch.



WARNING

Risk of electric shock. Can cause injury or death.

The iCOM microprocessor does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “unit off” mode of iCOM control.

Disconnect local and remote power supplies before working within.

- Check and clear obstructions in gravity lines leading to condensate pump.
- Remove sump and clean with a stiff nylon brush and flush with water.
- Inspect and clear clogs in discharge check valve and float mechanism.
- Reassemble and check for leaks.

11.7 Air Cooled Condenser and Drycoolers

- Clear coil surface of all debris that will inhibit airflow.
- Check for bent or damaged coil fins and correct.
- Do not permit snow or loose materials to accumulate around or under outdoor unit.
- Periodically consider commercial cleaning of coil surface.
- Inspect fans, motors and controls for proper operation and condition.
- Check all piping and capillaries for proper support.
- Inspect for leaks.

11.8 Reheat—Electric Reheat

- Inspect and clean reheat elements.
- Inspect and tighten support hardware.

11.9 Compressor

11.9.1 Compressor Oil



CAUTION

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty. See oil types specified in **Table 20**.

- Do NOT mix polyolester (POE) and mineral-based oils.
- Do NOT mix oils of different viscosities.

Consult Emerson or the compressor manufacturer if you have questions.

Table 20 Compressor oil types

Compressor Type	Refrigerant Type	
	R-22	R-407c
Copeland Scroll	POE Oil - ISO 22 Viscosity ¹	

1. Use Copeland POE Oil ULTRA 22CC, Mobil EAL Arctic 22CC or other Copeland-approved oils.

11.9.2 Scroll Compressors

Hermetic scroll compressors do not have an oil sight glass.

11.10 Compressor Replacement

Replacement compressors are available through your local Emerson office. If unit is under warranty, complete and include a warranty claim form available from Spare Parts with compressor that is being returned. The original compressor should be returned with sealed connections.

11.10.1 Compressor Motor Burnout

If a burn-out has occurred, a full system clean-out is required or continued compressor and system problems will be experienced.

For clean out warnings and procedures see Copeland Application Engineering Bulletin 24-1105 “Principles of Cleaning Refrigeration Systems”.

11.10.2 Compressor Replacement Procedure

1. Disconnect power and follow all warnings at front of this manual.
2. Attach suction and discharge gauges to access fittings. Recover refrigerant as per local codes.
3. Disconnect all electrical connections.
4. Detach rotalock valves from compressor.
5. Remove failed compressor.
6. If required, follow compressor manufacturer’s suggested clean-out procedures.
7. Install replacement compressor and make all connections.
8. Evacuate, charge and operate per **7.3 - Dehydration/Leak Test and Charging Procedures for R-407C and R-22**.



CAUTION

Risk of improper component reinstallation. Can cause equipment damage.

11.11 Facility Fluid and Piping Maintenance

Facility water and glycol quality remain a requirement throughout the life of the piping system. Fluid and piping system maintenance schedules must be established and performed. A local fluid maintenance program must be established that will evaluate fluid chemistry and apply necessary treatment. A periodic leak inspection of facility and unit fluid piping is recommended. Refer to **7.1.3 - Requirements of Systems Using Water or Glycol**.

11.12 Plate Heat Exchanger—Water Cooled Condenser



NOTE

*A strainer with #20 mesh (1mm) is **mandatory** in the supply pipework to protect particles in the water circuit from blocking the exchanger. Regular inspection and cleaning of the strainer is required to prevent elevated refrigerant head pressures.*

The water cooled condenser is made from multiple AISI 316 stainless steel plates, vacuum brazed together to form a compact and highly efficient heat exchanger. The plates are arranged so that the ridges of every other plate intersect one another on adjacent plates forming a lattice of contact points. The resultant separate channels provide counter-current flow of the water and refrigerant.

Proper maintenance and treatment of the cooling water system is important to reduce the risk of scaling, particularly in open tower systems. Regular chemical treatment, particularly in areas of high pollution or corrosive atmospheres is required.

The following table provides a general guide to the corrosion resistance of stainless steel and copper used in these plate heat exchangers.

Table 21 Guide to resistance of copper and AISI 316 stainless steel

WATER PROPERTIES	RECOMMENDED CONCENTRATION
Electrical conductivity	10-500 microS/cm
Alkalinity	70-300 mg/l or ppm
Chlorides	< 300 mg/l or ppm
Free Chlorine	< 1 mg/l or ppm

12.0 HVAC MAINTENANCE CHECKLIST

Inspection Date	_____	Job Name	_____
Indoor Unit Model #	_____	Indoor Unit Serial Number #	_____
Condenser/Drycooler Model #	_____	Condenser/Drycooler Serial #	_____
Room Temperature/Humidity	_____ °C/	%rH	Ambient Temperature _____ °C

Filters

- ___ 1. Check/replace filters
- ___ 2. Grille area unrestricted
- ___ 3. Wipe section clean
- ___ 4. Coil clean

Fan Section

- ___ 1. Fan wheels/guards free of debris
- ___ 2. Check belt condition (if applicable) - replace if needed
- ___ 3. Check bearings. Ensure wheels rotate freely.
- ___ 4. Check pulleys (if applicable) - replace if worn
- ___ 5. Check motor mounts
- ___ 6. Record motor current draw

L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

___ Compare to nameplate amps

Reheat

- ___ 1. Inspect elements
- ___ 2. Check wire connections and safeties (inside reheat box)
- ___ 3. Reheat amp draw

Stage1-L1 _____ L2 _____ L3 _____

Stage2-L1 _____ L2 _____ L3 _____

Infrared Humidifier

- ___ 1. Check drain lines and trap for clogs
- ___ 2. Check/clean pan for mineral deposits
- ___ 3. Clean reflector
- ___ 4. Check water make-up valve for leaks
- ___ 5. Check humidifier lamps (replace if burnt out)
- ___ 6. Check wire connections (inside humidifier box)

___ 7. Humidifier amp draw L1 _____ L2 _____ L3 _____

Immersed Electrode (Bottle) Humidifier

- ___ 1. Check drain lines/trap for clogs
- ___ 2. Check water make-up valve and all hoses/connections for leaks
- ___ 3. Clean strainer
- ___ 4. Replace electrodes/humidifier bottle if necessary. Check orientation and re-tighten.
- ___ 5. Check operation of humidifier (fill/flush)
- ___ 6. Humidifier amp draw L1 _____ L2 _____ L3 _____

Condensate Pump

- ___ 1. Check for debris in sump
- ___ 2. Check operation of float(s) (free movement)

Refrigeration Piping

- ___ 1. Check refrigerant lines (clamps secure/no rubbing/leaks)
- ___ 2. Check for moisture (sight glass)

Water Cooled Condensers

- ___ 1. Check water regulating valve operation
- ___ 2. Cap tubes (not rubbing)
- ___ 3. Check for water/glycol leaks
- ___ 4. Entering water temperature _____ °C
- ___ 5. Leaving water temperature _____ °C

Compressor Section

- ___ 1. Check oil level
- ___ 2. Check for oil leaks
- ___ 3. Check compressor mounts
- ___ 4. Cap tubes (not rubbing)
- ___ 5. Check wire connections (inside compressor terminal box)
- ___ 6. Compressor operation (vibration/noise)
- ___ 7. Suction Pressure Circuit #1 _____ Circuit #2 _____
- ___ 8. Discharge Pressure Circuit #1 _____ Circuit #2 _____
- ___ 9. Superheat Circuit #1 _____ Circuit #2 _____
- ___ 10. Subcooling Circuit #1 _____ Circuit #2 _____
- ___ 11. High pressure cut out Circuit #1 _____ Circuit #2 _____
- ___ 12. Amp draw
 - ___ Circuit #1
 - L1 _____ L2 _____ L3 _____
 - ___ Circuit #2
 - L1 _____ L2 _____ L3 _____

Electrical Panel

- ___ 1. Check circuit breakers
- ___ 2. Check contactors
- ___ 3. Check wire connections

Controls

- ___ 1. Check/Verify Control Operation (Sequence)
- ___ 2. Check humidifier high water alarm operation
- ___ 3. Check operation of the air safety switch
- ___ 4. Check setting/operation of the filter clog switch
- ___ 5. Check/test changeover device(s)
- ___ 6. Check/test water detection device(s)

Air Cooled Condenser / Drycooler

- ___ 1. Coil clean
- ___ 2. Motor mounts tight
- ___ 3. Bearings in good condition (motor)
- ___ 4. Piping support/clamps secure
- ___ 5. Check wire connections
- ___ 6. Stat settings
- ___ 7. Glycol level
- ___ 8. Glycol solution _____ %
- ___ 9. Fan speed control operation
- ___ 10. Motor amp draw
 - ___ Circuit 1

Fan 1 _____	Fan 2 _____	Fan 3 _____
Fan 4 _____	Fan 5 _____	Fan 6 _____
 - ___ Circuit 2

Fan 1 _____	Fan 2 _____	Fan 3 _____
Fan 4 _____	Fan 5 _____	Fan 6 _____

Glycol Pump

- ___ 1. Check pump rotation
- ___ 2. Check for glycol leaks
- ___ 3. Pump pressures

#1	Suction _____	Discharge _____
#2	Suction _____	Discharge _____
#3	Suction _____	Discharge _____
- ___ 4. Amp Draw

#1	L1 _____	L2 _____	L3 _____
#2	L1 _____	L2 _____	L3 _____
#3	L1 _____	L2 _____	L3 _____
- ___ 5. Pump changeover (if multiple pumps)

Notes _____

Signature _____

Company _____

Make photocopies for your records. Compare readings / information to previous maintenance work-sheet. To locate your local Emerson Representative for Liebert engineered parts, check the Emerson Web site: www.emersonnetwork.com.au or call 1300 367 686.

NOTES

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